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THE PROGRESS OF THE SALE OF POISONS BILL.

The second reading of the amended Sale of Poisons Bill took place on the 4th of June. Although the Bill was found to be considerably improved and simplified, by comparison with the Bill originally introduced, yet some objectionable provisions being still retained, it was necessary to adopt measures for obtaining further amendments, and communication was made with Lord Derby requesting the favour of an interview. The Poison Bill Committee was also summoned, and fully considered the provisions of the Bill. The Earl of Derby appointed Wednesday, the 16th of June, for the interview; which, however, did not take place, on account of the indisposition of his Lordship. The Bill having been committed *pro formâ* for the introduction of some verbal amendments, was on the paper for Thursday, the 17th, when Lord Derby being still unable to attend, it was deferred until the 24th. In another part of this number will be found the entire Bill *as amended on re-commitment*. It appears from the tenor of the discussion which took place in the House of Lords on the second reading, that it was the desire and intention of Lord Derby to amend the Bill in such a manner as might be satisfactory to the Pharmaceutical Society, and also to the College of Physicians, to whom the report of the Society had been submitted. This might easily have been effected if an opportunity had been afforded for a conference between the representatives of the College of Physicians and of the Pharmaceutical Society on the subject, but unfortunately the question had been submitted by Lord Derby not simply to the College of Physicians, but to a deputation consisting of physicians and others, whose reply was referred to in general terms at the Annual Meeting of the Society.* This not being a public document, no opportunity existed of noticing it officially, or averting by anticipation the effect of one of the recommendations it was reported to contain, and which, as we expected, has now become a serious ground of objection to the Bill. We allude to the 9th section, which provides for the appointment of a Board of Examiners consisting of three persons, one appointed by the College of Physicians, one by the Society of Apothecaries, and one by the Pharmaceutical Society. The introduction of such a proposition can only be accounted for on the supposition that the facts of the case have not been fairly considered. The proposed Board, although nominally having reference merely to poisons, would be, in fact, a Board for the Examination of Chemists and Druggists, and the certificates granted by the Board would be used by the possessors, and looked upon by the public, as evidence of qualification to carry on the business of a Chemist and Druggist. The fee on examination being much lower than the amount payable on registration as a Pharmaceutical Chemist, and the standard of proficiency being low in proportion, while the distinction between that and the superior qualification would not be generally understood, the inevitable result of this arrangement would be that a large number of candidates would be satisfied with the grade of a Chemist and Druggist, thereby saving themselves the trouble and expense of qualifying for the examination of the Pharmaceutical Society. This description of competition instead of being beneficial to the public would be quite the reverse, and would frustrate the efforts of the Society to raise the qualifications of Pharmaceutical Chemists, as a strict observance of the regulations would drive away candidates to the cheap and easy Board. The Pharmaceutical Society, under such circumstances, would rapidly decline in numbers and influence, and would therefore be unable to maintain its character and efficiency as a public institution.

It is worthy of remark, that the proposed Board of three Examiners appointed by three distinct bodies, would be for the time being collectively irresponsible,

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each being individually under separate and possibly conflicting jurisdiction with reference to his colleagues. Having no premises or office in which to meet, no specimens, books, or apparatus for conducting an examination, no secretary or other officers for carrying on the business of the establishment, this new Board would require, before commencing operations, to form an institution, and provide the requisite machinery, similar to that which now exists, and has been for many years in active operation in the establishment of the Pharmaceutical Society. Moreover, the duties of this new Board for the first year or two would consist in examining, not the qualifications of candidates, but the evidence as to the date at which each applicant for a licence to sell poisons commenced business, those who commenced prior to a certain date being entitled without examination to receive such licence. It will scarcely be suggested that for such a duty the joint services of a Physician, an Apothecary, and a Chemist would be appropriate.

The proposed new Board, besides being quite unnecessary, and calculated to retard instead of promoting the progress of Pharmacy, is also objectionable from the nature of its constitution. When it was proposed by Mr. Hawes, about the year 1840, to introduce a provision for the examination of Chemists and Druggists by a Board consisting of Physicians and Apothecaries, the proposition gave rise to the most vigorous opposition. The Apothecaries having recently left the ground which was then occupied by the Chemists, and having become medical men without entirely relinquishing their former functions as Pharmaceutists, a certain amount of jealousy existed between these two bodies which caused any interference on either side to be a source of distrust and dissatisfaction. Fortunately, this feeling has of late years considerably subsided, in consequence of the mutual endeavours to avoid unnecessary clashing of interest, and to assign to Pharmacy a separate and independent position in the profession. The appointment of a representative of the Society of Apothecaries on a Board appointed for the examination of Chemists and Druggists, would tend to revive the former jealousy, and the attempt to introduce such a measure would naturally be met with a vigorous resistance on the part of the Chemists. At the period above referred to, when Mr. Hawes introduced his Medical Reform Bill, the Chemists had no institution providing for the education or examination of their members, yet the validity of their objection to the proposed jurisdiction was not disputed, and Mr. Hawes assured the deputation who waited on him that he had no desire to place the Chemists in a derogatory position, but he believed the institution of an examination in the department of Pharmacy would be beneficial to their interests and character; and as they were not organized, and did not possess the means of carrying out such examination, the only alternative was to obtain the aid of the Apothecaries. Upon a full discussion of the question with the objections urged against it, the proposition was withdrawn.

A great change has taken place since that time. The Chemists, although triumphant in their opposition to the threatened interference, felt that they were in one respect in a false position. They had been offered a *status* as an educated body, which they had declined; not because they undervalued the status or despised the education, but because they were not willing to sacrifice their independence. Taking a glance at the professional position of the Pharmaceutists on the Continent, and feeling themselves not at all flattered by the comparison, they resolved to supply the deficiency by means of a voluntary association. By perseverance and labour up to the present time (a period of about seventeen years), the Society has introduced a complete reform in the education of Pharmaceutical Chemists. The Board of Examiners has been in regular operation for many years; since 1851, under the sanction of an Act of Parliament; and the pretext for calling in the Apothecaries to assist in the examination of Chemists and Druggists no longer exists. During the progress of the Society, one of its leading objects has been the protection of the public against danger from poison, and in the preamble of their appeals to the Legislature for assistance in their undertaking, the liability to accidents from

poisons has been prominently noticed as an evil, for which pharmaceutical education would be the most effectual remedy. For a long time these appeals, although supported by evidence, were unheeded; petitions and memorials were thrown under the table. The Society was supposed to be a trade union, established for the benefit of its members; and the principles on which it was founded not having been understood or investigated, its importance as a public institution was overlooked.

At length a panic arose about the sale of poisons, and after some futile attempts to frame a series of restrictions which should be infallible in preventing criminal and accidental poisoning, it was discovered that the principal safeguard consisted in the intelligence and education of the vendors of these dangerous substances, and that the welfare of the public required that such persons should pass an examination. This is what the Chemists had already provided for. Their machinery was complete; with much difficulty they had obtained the sanction of the Legislature for their institution as a voluntary society; and nothing was wanted but a slight extension of its existing powers to secure to the public the benefit which the Chemists had long ago prepared, and which the House of Lords has recently ascertained to be desirable. Under these circumstances, it appears marvellous that it should have been deemed expedient to supersede the Board of Examiners appointed under the Pharmacy Act, in favour of a new Board, in which a prominent position is given to representatives of two medical bodies, who up to the present time have evinced no disposition to take an active part in the movement. We believe the Apothecaries have no desire to interfere or place themselves in a position not satisfactory to all parties concerned. In fact, we have heard it remarked by some members of the Society of Apothecaries, that the preponderance of medical men on the proposed new Board is objectionable, as it might be resorted to by quacks, under the impression that the certificate implies a sort of medical qualification.

We are not aware that the College of Physicians has any particular desire to be troubled with a participation in the examination of dealers in poison, although the relative positions of the Physicians and of the Pharmaceutical Chemists are such that the objection above stated with reference to the Apothecaries does not apply. Before the passing of the Apothecaries Act of 1815, it was proposed to the College of Physicians to undertake the examination of the Apothecaries, which the College declined. In the years 1841 and 1842 several communications took place between the College of Physicians and the Pharmaceutical Society with reference to the constitution of a joint Board for the examination of Chemists and Druggists. But the College appearing to take but little interest in the proposal, and some difficulties arising in regard to the arrangement, it was abandoned, and it was decided that the right course would be the appointment of an independent Board by the Society. This is the Board which has been in operation up to the present time, and is now acting under the authority of the 15th and 16th Vic., cap. 56. We have ascertained that the objection to the adoption of this Board for the purposes of the Sale of Poisons Bill, instead of appointing a new one, is the idea that the Pharmaceutical Society and its Board of Examiners are not sufficiently under the control of the Government, and that, however zealous the founders of the Society may be in the performance of their duties for their own credit as the originators of the undertaking, their successors, not feeling the same kind of responsibility, might be careless or neglectful of their trust, and thus abuses might arise, over which there would be no efficient check. We may observe that the proposed new Board would be much less responsible, consisting of three Examiners, each under a different authority, with no laws but their own will. The Board of the Pharmaceutical Society is annually appointed by the Council, who are elected by the Members at their anniversary, and the entire proceedings are conducted under bye-laws which cannot be altered without the sanction of the Secretary of State. But waiving this argument, it is proposed by way of compromise, to

obviate any possible objection, by substituting a section to the following effect for the 9th section of the Bill:—

IX. For the examination of future Pharmaceutical Chemists in England, a Fellow of the College of Physicians of London, appointed by the Secretary of State (the names of three Fellows being proposed by the College for that purpose, of whom the Secretary of State shall select one), together with the Examiners appointed under the 15th and 16th Vict., cap. 56, shall be and are hereby empowered to conduct the Examinations, in accordance with the provisions of the aforesaid Act of Parliament and the Bye-laws of the Pharmaceutical Society; and every such Examiner shall hold office for such term as the Secretary of State or the Council of the Pharmaceutical Society respectively, by whom he is appointed, shall think fit and direct.

It is also proposed that the following sections be substituted for the 10th, 11th, and 12th sections of the Bill:—

X. Every Person having carried on before the passing of this Act the Business of a Chemist and Druggist, shall, upon satisfying the Council of the Pharmaceutical Society of the fact of his having at the time aforesaid carried on such Business, be entitled, without Examination, to a Certificate to that effect, and to Registration and a Licence to sell Poisons.

XI. The Registrar appointed under the Provisions of the 15th and 16th Vict., cap. 56, shall from time to time make out and maintain a complete Register of all Persons licensed to sell Poisons under this Act, and shall be bound, on the Application of any Person paying One Shilling, to Certify whether or no any Person whose Name and Address shall be furnished to him appears on the said Register.

XII. There shall be paid to the Treasurer of the Pharmaceutical Society upon the grant of each Licence a Fee of One Guinea; and the Monies received in respect of such Fees shall be applied in Payment of the Expenses incident to the Duties to be performed under this Act, as the Council of the Pharmaceutical Society, with the sanction of the Secretary of State, shall from time to time direct.

It will be observed that the effect of the above provisions would be to reserve the existing vested rights of all persons in business as Chemists and Druggists at the date of the Act, and in future to make a distinct line of separation between the qualified Chemist and the chandler or general dealer, who, while he would still be enabled to sell jalap, senna, and other harmless medicines in country villages, as at present, would not be permitted to deal in poisons. This principle, if carried into effect, would greatly promote the public safety and the usefulness of the profession, *and is in fact the only part of the Bill which is of any practical value.* The provisions for registering the sale of poisons, with other restrictions of that nature, are not likely to diminish the sale. It is possible that they may occasionally prevent an accident or a crime, but in many cases the tendency would be to legalize and sanction the sale of poisons, which otherwise would be refused. For example—a person at the present time applies for some strychnia. A qualified Pharmaceutical Chemist, knowing the danger and feeling his responsibility, would refuse to sell it; he will not take the risk on himself. But when the law has defined the conditions under which he is to sell any poison, he has only to comply with those conditions, sell the poison, and his responsibility ceases. In fact, he could scarcely refuse to furnish the poison, if demanded by a customer, according to Act of Parliament. Some inconvenience will arise from the fact that several domestic medicines, in constant use, are included in the list of poisons. This, however, might be tolerated, for the sake of the preponderance of advantage in the provisions relating to qualification.

There are a few minor defects in the Bill which may be briefly noticed:— The 17th section empowers the Examiners to visit shops. This duty ought not to be imposed upon that Board, but might with safety be entrusted to the President and Censors of the College of Physicians, who at the present time are empowered to perform similar functions in the City of London. The provision for separating some poisons from other poisons according to an arbitrary distinction founded on Schedule A, can be productive of no possible benefit, as practical men have already pointed out. Nor do we see the necessity of

enforcing by Act of Parliament the use of capital letters in all poison labels. The object is that the labels should be conspicuous, and it would be severe to inflict a penalty of £5 because the letters of a label were not capitals although sufficiently conspicuous for the purpose intended. This, however, and some other points, are of minori mportance. We ought not, however, to omit to notice the very original idea of granting a certificate of qualification to sell poisons for five years, and after that time requiring an examination to be passed before the renewal of the licence.

The Bill having been deferred from the 24th, was handed over by Lord Derby to Lord Malmesbury, who, having pressure of other business on hand, entrusted it to the charge of Lord Hardwicke. The amendments above noted have been forwarded to Lord Hardwicke, and communications have taken place with several other members of the House of Lords, as well as with the President and other official representatives of the College of Physicians.

There is some reason to hope that the efforts which have been made to support the suggested amendments will be attended with a satisfactory result, in which case the Bill will go to the House of Commons in a form in which it ought to pass without opposition. If, however, we should be disappointed, and the appointment of the New Board of Examiners should be persisted in, the earliest information will be given to the Members of the Society, and to Chemists and Druggists generally, as in that case the most vigorous measures would be necessary to secure the rejection of the Bill by the House of Commons.

THE PROGRESS OF THE MEDICAL REFORM BILL.

All the Medical Bills, except the one introduced by Mr. Cowper, having been withdrawn, some persons are so sanguine as to believe that opposition is at an end, and that the remaining Bill will pass. Such an event, however, is not very probable, nor is it desirable, unless some amendment be introduced. The Bill as it now stands, provides for the "reform" of the Profession, by a process more like revolution. The College of Physicians, as the head of the department of medicine, would become practically obsolete, the rank and title of Physician being conferred by the Universities, and the proposed new Board of Examiners, without the necessity of connection with the College, which would therefore either resolve itself into its elements and vanish, or, shorn of its authority, continue to exist as a club or private society. The Medical branch of the Profession, instead of being united in an institution founded by Henry VIII., and hitherto considered as representing the general interests and regulating the qualifications of Physicians, would become divided into cliques or factions representing the several Universities granting degrees.

The rivalry between the Universities and the College of Physicians is impolitic and uncalled for. Each University should emulate other similar institutions in maintaining its character and position, but the graduates of all, when launched into the Profession, should throw aside school prejudices, and unite in the College of Physicians or the College of Surgeons, according to the branch of the Profession which they individually adopt.

Several important amendments will be proposed in Committee. If these should be adopted or a satisfactory compromise effected, the Bill may pass, otherwise it will be opposed on the third reading, and probably thrown out in the usual way.

PHARMACY IN VICTORIA, MELBOURNE.

We have received the second number of the *Quarterly Journal and Transactions of the Pharmaceutical Society of Victoria*. In our number for June last year we published a notice of the establishment of this Society, which took place on the 6th of March. It took its origin in the introduction of a "Sale of Poisons Bill," the obnoxious nature of which was such (being similar to the one originally introduced into the House of Lords in this country), that the entire body of Chemists and Druggists rose in self-defence, and by a vigorous resistance averted the calamity. A sympathy and disposition to co-operate, being thus

awakened among the previously disunited members of the Pharmaceutical body they resolved to form a permanent Society for the promotion of education and scientific improvement, and the protection of their interests. The laws and constitution of the Society resemble those of the Pharmaceutical Society of Great Britain; and the objects being the same it is intended to continue regular courses of lectures, scientific meetings, and other means of instruction. A quarterly periodical, similar in form and character to this journal, is established, and if the projected undertaking should be carried out with spirit and energy, there can be no doubt as to the advantage which will result, not only to the profession but to the public, by the improvement which will take place in the qualifications of dispensers of medicine.

THE STATE OF THE THAMES.

The stench of the Thames has become intolerable to both Houses of Parliament. If the collective wisdom would "put its shoulder to the wheel," instead of "invoking Jupiter," and wasting time in idle disputes, we might hope to see some progress made in the abatement of the nuisance, but notwithstanding the prompt and valuable assistance afforded by the laws of nature in decomposing and deodorizing the mass of filth which is accumulated in the river, this salutary influence is frustrated by the rapidity and perseverance of the movement in the opposite direction. The evil increases every year and has been greatly aggravated by the premature discontinuance of the use of cesspools without any adequate provision for the reception of the surplus solid sewage matter which was formerly carted away, but which is now added to the daily increasing conglomeration of corruption in the Thames. The hot weather and the want of the usual supply of rain to dilute the compound having brought the nuisance to a crisis, the subject has forced itself upon the attention of all classes of persons who frequent or inhabit the neighbourhood of the Thames. The gaseous enemy has taken possession of the ventilating shafts and air passages of the House of Commons; and Mr. Gurney, who, with other practical men, has investigated the subject, reports that the expensive apparatus erected under the superintendence of Dr. Reid, has ceased to be effectual, having become the vehicle for the poisonous emanations from the sewage river. It has been proposed to vacate the House, but no other convenient locality could be found for transacting the business of the nation. The Law Courts in Westminster have been almost poisoned, and the Judges gasping for breath. The steam boats on the river have been comparatively deserted, as few persons would risk their health unless from necessity, in such an atmosphere. A young woman who threw herself into the water at Blackfriars' bridge, although rescued immediately, was almost poisoned* by immersion for a few seconds in the broth. Such being the condition of the Thames, a Committee of the House of Commons is sitting to take evidence! adding another blue book to the ponderous volumes already mystifying the question. The substance of the evidence is comprised in two words, "It stinks." Some interesting details are contained in an Abstract of Report on the Sewage of Towns in another part of this number. Enough is known on the subject to convince any rational person of the necessity of substituting vigorous measures for idle words, but one obstacle to the accomplishment of the task, is the difficulty of settling the question, who is to pay the expense, the metropolis, or the country at large? Considering the magnitude of the work and the vital importance of the object in a sanitary point of view not only to the inhabitants but to all who ever visit the metropolis, the question surely ought to be dealt with as a national one. In one respect those who reside in the country are even more interested in the result than the inhabitants of London, since persons casually visiting an infected district are more liable to fall victims to its deleterious effects than those who, residing on the spot become acclimatized, and thus, in some degree, protected against such influence.

* Police Report, *Times*, June 24th.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

AT A MEETING OF THE COUNCIL, *2nd June,*

Present—Messrs. Ballard, Bell, Bird, Bottle, Brew, Davenport, Deane, George Edwards, Hanbury, Hollier, Meggeson, Morson, Squire, and Waugh,—being the first Meeting after the Anniversary,—the following Officers of the Society were elected :—

JACOB BELL .....*President.*
WILLIAM LIONEL BIRD.....*Vice-President.*
DANIEL BELL HANBURY .....*Treasurer.*
ELIAS BREMRIDGE was also re-appointed *Secretary and Registrar.*

LIST OF MEMBERS, ASSOCIATES, AND APPRENTICES (*continued.*)

Elected in June.

MEMBER.

GLASGOW.....Kinninmont, Alexander

MAJOR EXAMINATION.

Barrs, John Adcock.....Grantham
Baschet, Pierre Edmond .....Mauritius
Boullé, Janvier Alfred.....Mauritius
Mercer, Nicholas ....Liverpool
Minet, Alphonse Edouard .....Mauritius
Steevens, Joseph Gregory .....Guildford

MINOR EXAMINATION.

Dowse, Thomas Stretch .....Bradford-on-Avon
Hinton, Henry Archibald.....London
Weston, Samuel John .....Leicester

REGISTERED APPRENTICES.

NAMES.	RESIDING WITH	ADDRESS.
Blundell, Joseph Argeat.....	Mr. Groves	Weymouth
Butler, Edward D. B.	Mr. Penney	Poole
Clarkson, Sidney	Mr. Macarthy	Romford
Colby, John	Mr. Colby	Brighton
Dodshon, Edward.....	Mr. Dodshon	Sunderland
Dumolo, John Thomas	Mr. Parker.....	Birmingham
Maudson, Joseph Walker	Mr. Maunder	Sheffield
Olliver, George Edward	Mr. Groves.....	Weymouth
Pearcey, Herbert Augustus.	Mr. Biggs	London
Stanley, Robert Swan	Mr. Wortley	Durham
Tolbert, Thomas William H.	Mr. Froud	Dorchester
Willan, James Ridgway	Mr. Pratt	Wolverhampton

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

THE Sixteenth Meeting of the Session was held in the Royal Institution, May 20, 1858,

JOHN ABRAHAM, ESQ., IN THE CHAIR.

Mr. EDWARDS, of New Brighton, was elected a Member.

The following donations to the Library were announced by the Secretary :—*Gregory's Handbook of Chemistry*, 2 vols., *Archer's Popular Economic Botany*, *Brande's Dictionary of Materia Medica and Pharmacy*, *Liebig's Chemistry in its Application to*

Agriculture and Physiology, Pharmaceutical Latin Grammar, from Mr. Coupland. *The Sizes and Rotation of the Sun and Planets*, from the Author, Mr. R. Linton.

The SECRETARY stated to the Meeting that he had received about an hour ago a note from Mr. G. R. Berry, regretting his inability to read the paper of the evening, "On the Aspects of Photography," in consequence of a severe attack of illness, but would be happy to do so on some future occasion.

The CHAIRMAN in commenting on the communication which had just been made, expressed his sympathy with Mr. Berry, and trusted, that as the Meeting had been disappointed in not hearing the lecture on the present occasion, they might look forward to the promise being fulfilled on an early date.

Some desultory conversation took place in regard to the character of the water supplied to the town, after which the proceedings terminated.

Royal Institution, June 3, 1858.

THE PRESIDENT IN THE CHAIR.

Mr. DAKIN, Church Street, was elected a Member.

The SECRETARY announced several donations to the Library and Museum. Amongst the latter were several cereals, sulphuret of lead, native sulphur, &c.

Mr. WILLIAM H. SAMUEL placed on the table for examination some portions of an Egyptian mummy. He remarked that it was sent from Cairo, and seemed to a certain extent to be an article of commerce, on account of the quantity of asphalt which they contain; he pointed out the thorough permeation of the asphalt, which not only had filled the cavities of the body, but had completely penetrated the flesh and blood-vessels, so as to represent the appearance of a hard solid piece of asphalt. After describing the mode of preparation of mummies, he adverted to their former use in medicine, under the names of mummea vera, balsam of mummy, and mentioned the fact that the mummy asphalt was an article much used by painters, and suggesting several other applications.

Dr. EDWARDS gave some interesting information respecting the physiological action of glonoine. He also introduced to the notice of the meeting some sugar xyloidine, a substance made by the action of nitric and sulphuric acid on sugar.

Mr. G. R. BERRY then delivered the lecture of the evening (postponed from last meeting),

ON THE ASPECTS OF PHOTOGRAPHY.

WHEN Daguerre and Talbot published their discoveries not yet twenty years ago, the most enthusiastic of their admirers in the wildest flights of their imaginations never dreamed of the marvels already accomplished in rapidity and cheapness, and in the universality of its applications. A comparison of the two years 1840 and 1858 will give some amusing contrasts. In 1840-41 two or three mysterious blue skylights of large dimensions might be observed in London, and in the windows below might be seen the grave effigies of some of the upper ten thousand who had submitted themselves to the tedious and not altogether satisfactory process of the then imperfectly understood Daguerreotype. The price of a portrait $2\frac{1}{2}$ inches by 2 was then 21*s.* upwards, and such was the demand for these silver miniatures paid for in gold, that, like the old stage-coach travelling, you had to book your place some days beforehand. Turn now to 1858, the poor man for sixpence can have his portrait $2\frac{1}{2}$ inches by 2 produced by the collodion process quite equal to my lord's of 1840, and perhaps the remaining specimens of the latter may after a lapse of the same number of years be as rare as the early Daguerreotypes.

In apparatus the change has been as great. Single lenses used for portraits in 1840, price £2 2*s.*, may now be had, by those who want them, for the same number of shillings, while the more perfect and efficient double combinations of the opticians of Vienna and Paris, price £6 upwards, are now successfully imitated for from 10*s.* to 30*s.*

In chemicals the same great change is apparent, more especially since the Exhibition of 1851, and the simultaneous free publication of the marvellous collodion process by the late lamented Scott Archer, whose discovery gives in one way or other, in the manufacture of chemicals, apparatus, glass, &c., it is supposed, employment to nearly a million individuals; and although many have made enormous fortunes, it is to be feared the straitness of Mr. Archer's pecuniary affairs sadly embittered his last illness. I need scarcely quote the price-lists of the following chemicals for

the two periods—they are, of course, familiar to you all, and in proportion as the price has declined the consumption has increased:—hyposulphite of soda, nitrate of silver, sulphuric æther, pyrogallic and gallic acids, cyanide of potassium, &c. So much for the commercial aspects of the science.

It would be useless to recapitulate the various evolutions of the processes employed during the interval; let us take the present, therefore, into consideration, and it may undoubtedly be called the collodion era:—Positive collodion portraits, paid for in pence, old rags, or bones,* up to the exquisite specimens for which Liverpool stands unrivalled; collodion negative portraits and views for the latter, dry collodion being just now especially in vogue to the comparative exclusion of the calotype and wax paper processes. In our own hands we prefer the honey processes of Messrs. Lyte and Shadbolt.

As the dry collodion process has been the means of evolving the production of a very useful modification of pyroxyline, and as the preparation of photographic requisites is now a recognized branch of the retail Chemist's business, perhaps a few hints for its successful production may be acceptable.

Pyroxyline, suitable for the dry process, must not yield a contractile film, such as is produced by strong nitric acid sp. gr. not less than 1.47 with sulphuric acid at a low temperature: the best variety is produced by using equal volumes of good commercial nitric acid, free from nitrous acid, and which will average sp. gr. about 1.42, and full strength sulphuric acid. The admixture of these acids in quantities of not less than one pint of each, will produce an elevation of temperature to 135 or 140 Fah.; into this while thus heated, plunge as much paper, cotton, or what is far preferable, old linen rag, as the liquid will completely cover, and allow to digest at least four hours, then wash well away every trace of acid, and dry in the open air; the product is soluble without residue in the usual proportions of alcohol and æther; yields a film perfectly structureless yet coherent, free from reticulation, adheres firmly to the glass, and does not blister upon the application of the various preservative preparations for the so-called dry collodion process.

For vindication of my assertion as to the superiority of Liverpool positives, I lay before you some exquisite specimens by Keith; and I claim for Liverpool, in the persons of Messrs. Keith and Barker, the successful production of really vigorous and effective portraits, with perfect whites and shadows, free from solarization, without the metallic glare of the Daguerreotype, and with a greater solidity of image. This result has been attained by the employment of a heavily iodized collodion, of considerable thickness, a strong silver bath, rather acid, and a proportionally strong iron developing solution, containing a liberal quantity of strong nitric acid per ounce. Next in order may be noticed the more recent variations of the negative collodion process; the employment of glycyrrhizine, &c., in the collodion as in the silver bath, to increase the intensity of the resulting negatives; the searching examinations of commercial nitrate of silver, as to its adulterations and contaminations; the particular and peculiar sensitizing agents for the collodion; and the various minute precautions to be observed in manipulation. These have resulted more to the profit of the photographic chemist than to the success and edification of the enterprising photographic amateur. We are naturally led on to the startling announcement of the storage of light, the bottling-up of sunshine in summer against the dark days of winter; in fact, the accomplishment in our earth of the same results as the veracious Gulliver of our youth assured us was the common practice in Laputa—growing cucumbers by means of sunshine preserved in bottles. You have now in your reach the means of far improving upon the process of the Laputans; for if sunshine be requisite for the rapid growth of this vegetable, you can, by wrapping them at night in a sheet of sunshine paper, give them the benefit of perpetual light.

With perfect truth it may be said that every ray of the sun that falls upon our earth leaves an impress, a knowledge and application of the requisite developing agent being alone wanted to render it visible. How many visible proofs of the action of light surround us, in the occupants of our bottles and drawers: such as the crystallization of camphor, on the exposed side of its containing vessel; the change of

* In several of the poorer districts of Liverpool the foregoing articles are taken in payment for the very rude specimens in portraiture taken by these photographic marine store establishments.

colour in rhubarb, aloes, guaiacum, ginger, and many others; the darkening of furniture, of wood, such as the impression of the letter-press of a printed placard, which has been pasted upon a newly-planed surface of deal or mahogany, and exposed for a week or two to sunlight. A drenching shower washing off the paper, thus frequently reveals the visible impression beneath.

Again, the colorific action of light may be observed in numberless cases in the varied hues of flowers under different exposures—the white colour of the earthed-up celery, the centre of the endive, cabbage, &c.; and even in the preparation of pigments, such as carmine, it has been for many years asserted that the samples prepared in bright summer weather are always more vivid in colour than those produced in winter.

Returning again to the supposed storing up or condensation of light recently discovered by Nièpce, we may consider the development of latent images. If it be asked what is the primary effect produced by the chemical rays upon a sensitive surface, the most convenient explanation is, that a molecular change is produced, and vague as the answer may appear, it is all we can at present offer. As an illustration of the subtle nature of the changes induced by light, we will take by means of the camera an impression of the gas flame upon a collodionized plate, and develop the image with the ordinary pyrogallic solution; the resulting image is a negative one, and when fixed in the usual way is opaque to transmitted light, and if softly polished with cotton wool or a silk handkerchief, yields a bright metallic silver surface, thus proving that metal is deposited. We will now go through the same preliminary process with another plate, and commence the development as before, but when the impression is pretty well out and visibly opaque (thus proving the deposition of metallic silver) we will approach it near the flame for a second or two, when in a minute or two the silver is removed from the image, which becomes transparent, while the surrounding film becomes darkened and opaque, and when fixed is what is termed a transparent positive, the exact converse of the other.

A novelty in the development of collodion negatives is worthy of notice, and is as follows:—Pour saturated solution of gallic acid upon the plate to be developed for a minute or two, then pour it back into the glass measure, and drop in a small quantity of solution of acetate of lead, stir together, and pour backwards and forwards over the plate, the image at once appears, and with a little management good negatives can be thus produced, and with a less exposure in the camera than is required when pyrogallic acid is used.

We now come to Nièpce's discovery. He found that by exposing even a sheet of pure white paper to some hours of bright sunshine, if it were placed in contact in the dark with a piece of sensitive paper, it became darkened as though it had itself been exposed. He found that paper imbued with nitrate of uranium or tartaric acid possessed this property in a more marked degree, and thus by placing an engraving or a negative photograph upon such paper and exposing to the solar rays, it was possible on removing the negative in darkness and super-imposing the paper upon the ordinary sensitive paper, to produce a print precisely as if by ordinary exposure. Moreover, if some of the exposed paper were hermetically closed in a metallic tube, and opened in darkness after the lapse of many days, and a piece of sensitive paper applied to the opened end, it became blackened as if exposed to the solar rays in the ordinary manner.

If in reality light were actually stored up and accumulated in these papers, would it not go far to upset the undulatory theory? for what but light rays absorbed could produce these marvellous results; but there are objections that may be raised which have yet to be answered, as for instance:—If it were light stored up it ought to possess the usual attributes of that agent, and print an impression through a negative in the dark; this in our hands it has totally failed to do, the intervention of a piece of glass or even paper effectually preventing the production of the image, and although under certain circumstances, viz., moisture and a very considerable elevation of temperature, the paper is blackened at the end of the tube, the intervention of a plate of glass effectually prevents the action, and as analogous phenomena may be produced by the vapour of phosphorus and other bodies, the inference may be fairly deduced that storage of light has not yet been proven.

As in other discoveries so in this, there are bye-products apparently of more value than the primary. One is very promising, and well worthy of careful and patient

investigation; it is as follows: the formula given is by H. de la Blanchère, a fellow-worker with M. Nièpce:—

Take Nitrate uranium, 100 grains
Distilled water, 1 oz.
Dissolve, and preserve in the dark.

On this solution float ordinary photographic paper (unsalted) until saturated, and dry, also in darkness. This paper is then to be used in the printing-press the same as in other development processes, the exposure varying from a few minutes upwards according to the intensity of the light and the density of the negative.

When taken from the press it is floated upon a solution of nitrate of silver, thirty grains to the ounce, rather acid; the image at once begins to develop, and is out in less than a minute; to stop the development when complete, all that is necessary is washing in water, and a few changes of water completely fixes the picture without the intervention of hyposulphite of soda, and consequently free from all danger of sulphurization, the alleged cause of the fading of paper photographs; yet the impressions will bear immersion in boiling solution of cyanide of potassium without alteration, a mode of procedure that would instantly obliterate any ordinary photograph.

The paper was illustrated by various specimens, experiments, &c.

After which the PRESIDENT proposed a vote of thanks to Mr. Berry, which was carried by acclamation.

June 17th, 1858.

The Eighteenth and last Meeting of the Session was held on the above evening,

H. S. EVANS, ESQ., IN THE CHAIR.

The SECRETARY announced the donation of Delamotte's *Photography* to the Library, from Mr. Walls.

Mr. J. R. ARNOTT, in presenting a specimen of phosphate of lime which had just been imported into Liverpool, stated that a very rich and valuable deposit of this substance had been found by some enterprising Americans on reefs in the Caribbean Sea. This new importation from that locality had been analyzed by one or two eminent Chemists here, and found to contain from eighty to eighty-five per cent. of phosphate of lime, thus proving its great value as a fertilizer in agriculture, and a rich source of phosphorus and phosphoric acid to the manufacturing Chemist. Under the microscope the laminæ of the bone are clearly discernible, and the conjecture is, they are the remains of antediluvian mammalia, &c., but how accumulated in such masses, and that too on rocks of evident volcanic origin, is startling to the geologist, and opens up a new field of research, like the deposits in Spain and elsewhere, which Mr. Arnott called further attention to.

The PRESIDENT then introduced to the notice of the meeting the Sale of Poisons Bill (a copy of which was laid on the table), and read over several of the clauses, commenting on each; he also gave a brief outline of what the Poisons Committee of this Association had done in the matter, and concluded by reading a memorial to the Earl of Derby, which had been adopted at the last meeting of the Committee, and confided to Dr. Edwards for presentation.

The memorial was as follows:—

"*Royal Institution, Liverpool, June 14th*, 1858.

"TO THE RIGHT HONOURABLE THE EARL OF DERBY.

"May it please your Lordship,

"The Committee of the Liverpool Chemists' Association appointed to consider the provisions of the 'Sale of Poisons Bill' beg to thank your Lordship for the facilities afforded them upon a former occasion for laying their views before the Select Committee of the House of Lords, and to acknowledge the courtesy of your Lordship to their representatives upon that occasion.

"The Committee observe with satisfaction that many of the principles urged in their memorial have been acknowledged and acted upon in your Lorship's amended Bill, which they believe may, with some modifications, be rendered a practicable and useful measure.

"The Committee beg to remind your Lordship, that in their former Memorial

they strongly urged the claims of the Pharmaceutical Society to the full confidence of the Legislature, and they regret that those claims are but partially acknowledged in the present Bill. These they would respectfully press upon your Lordship's attention. The Pharmaceutical Society has for the last seventeen years done everything that could be accomplished by a voluntary association towards the end for which the present Bill is framed—viz., the protection of the public against ignorance and carelessness on the part of the vendors of drugs and dispensers of medicines. They have educated, and examined, and associated together, a large number of intelligent and competent members, at a considerable cost of time, money, and zeal; and they are fully competent to carry out the provisions of the Bill, without the intervention of other medical corporations as proposed, which would, they conceive, only mislead the public as to the nature of the qualifications which the certificate is intended to indicate.

"The Committee, therefore, beg to urge that the whole of the powers under the Act be granted to the Pharmaceutical Society, and the Board of Examiners already in existence under the 15th and 16th Vict., cap. 56. The Committee also beg to submit that those Chemists in business at the time of the passing of the Act are entitled to the undisturbed exercise of their business without examination, and that the further exercise of that business with safety and credit for five years would be a sufficient guarantee of their ability to serve the public without the further test of examination.

"The Committee beg respectfully to urge these considerations upon your Lordship, and to request you to give audience to the deputation whom they have authorized to present this Memorial, and who are prepared to support the views of this Association.

"We are,
"Your Lordship's most humble and obedient servants
"(On behalf of the Committee),
"H. Sugden Evans, *President.*
"John Shaw, *Hon. Sec.*"

Mr. William H. Samuel then read the closing paper of the session, entitled "Incentives to the Study of the Microscope." He commenced his paper by a short sketch of the history of the microscope, dwelling on the disadvantages it laboured under for want of achromatic powers till they were discovered in 1829 by Lister. After explaining the optical principles involved in its use, he rapidly glanced at its varied applications to geology, fossil anatomy, botany, entomology, and to the detection of adulterations, and concluded by urging its great value as an aid to home training, on account of the wonder-laden lessons it taught.

The thanks of the meeting were voted to Mr. Samuel for his paper, and to Mr. Evans for his conduct in the chair during the session, and the proceedings terminated.

ORIGINAL AND EXTRACTED ARTICLES.

INFUSUM NUCIS JUGLANDIS REGIÆ.

(Tisane de Feuilles de Noyer.)

BY MR. JOSEPH INCE.

The medicinal use of the Walnut is extremely limited. The unripe outer rind of the fruit yields a dark-brown dye, and the same outer rind, when distilled with brandy, constitutes the old preparation called Dr. Sully's Walnut Water. This was once in some demand, as a remedy for nausea and sea-sickness, and is occasionally asked for now, but it is regarded chiefly as a cellar curiosity. This water is analogous to the "Eau des trois noix," so named from being distilled from the Walnut at three different periods, and which is esteemed in France as a stomachic.

Our house used to prepare the Oil of Walnuts, by cold expression; from seven to eight ounces were obtained from one pound. The Oil was regularly bought by an eccentric and well-known chiropodist, who conversed in a patchwork selection from various modern languages.

For what precise purpose he employed the oil I was never able to discover, but it was certainly not with the usual intention of mixing salad. His practice, though not based on the regulations of the College of Physicians, met with the approbation of numerous patients, for people at the bottom of their hearts put great faith in wayside remedies.

The specific of the Italian Corn-extractor was at least entitled to an equal meed of praise as that awarded to certain Herbal Cough Lozenges not far from Blackfriars Bridge, which are described, in a characteristic transpontine placard, as "not made from Opium or other life-destroying anodynes, not a very learned or scientific preparation, not to be found in any of the many Pharmacopœias, not even approved of by the Faculty; but only a plain, simple, old woman's remedy, in which nature's medicine, herbs, are solely used." This announcement (exhibited in gigantic letters in the window) is an incidental evidence of the popular belief that herbs belong to nature, while minerals do not.

Little remains to be stated about the Walnut, except that the oil just mentioned, when prepared by heat, is one of the drying oils of commerce, valuable as such in painting, and, moreover, well adapted for purposes of combustion; that at Toulon a sugar is extracted from the exuded sap, similar to that obtained from Beetroot; while it is unnecessary to mention that Walnut wood is of admirable service to the upholsterer.

I wish now to direct attention to the pharmaceutical employment of the Walnut leaf. It is well known that some persons find considerable difficulty in taking Cod Liver Oil. We have all heard fabulous stories of children fighting for their daily dose—of invalids waiting with eagerness for the happy moment when they may drink luxuriously their appointed tablespoonful; but in spite of these highly-coloured narratives, we have also heard of cunningly-devised methods of obviating or covering its unpleasant taste. Coffee, milk-and-water, tincture of orange peel, and orange wine, have each in turn been recommended: in some instances all fail alike, and the stomach obstinately rejects the oil. In this dilemma considerable relief will be found in the infusion of dried Walnut leaves, made thus:—

INFUSUM NUCIS JUGLANDIS REGIÆ.

℞ Fol. Nucis Jugland. Siccat, ℥j.
Aquæ Bullientis, ℥x.

Fiat Infusum. Macera per horam in vase operto, et cola. Dose—a wineglassful with Cod Liver Oil.

Finding from experience that the Infusion was successful, I ventured on two other preparations. The first, a Concentrated Infusion, made in the usual way by percolation, and the subsequent addition of Spirit, the result being eight times the strength of the ordinary Infusion; the second, a Tincture of the dried leaves, prepared as follows:—

℞ Fol. Nucis Jugland. Siccat, ℥xvj.
Spirit. Tenuioris Cong, j.

Macera per dies septem; dein exprime et cola. Dose—one or two teaspoonfuls with Cod Liver Oil.

Both these were advantageous in those cases in which the Tincture of Orange Peel might be exhibited, but did not prove a substitute when the Tincture failed. The Infusion of *fresh* Walnut leaves is too aromatic, and consequently does not answer.

The Infusion of the *dried* leaves possesses the double advantage of being an effectual and inexpensive remedy.

31, *Southampton Street, Covent Garden.*

ON A NEW METHOD OF DETERMINING CHROMIUM IN CHROMIC ACID AND THE ALKALINE CHROMATES.

BY MR. THOMAS SALTER,
Student in Dr. Medlock's Laboratory.

Chromic acid in the soluble chromates is generally determined in the form of sesquioxide of chromium, and by one of the three following methods:—

1st. By adding to the soluble salt dissolved in water, hydrochloric acid, and passing through the solution a current of sulphuretted hydrogen.

2nd. By boiling a solution of the chromate with hydrochloric acid and alcohol.

3rd. By saturating the solution with sulphurous acid.

The first method is objectionable, especially on account of the offensive odour of the gas and the time required for the sulphur separated to precipitate.

The second method requires a considerable quantity of alcohol and long boiling, in order to reduce the chromic acid completely; moreover, before the chromium oxide can be entirely precipitated, the whole of the alcohol must be expelled, otherwise a pink-coloured filtrate will be obtained, containing some chromium in solution, after precipitating with ammonia, and consequently the results will be incorrect.

The third method involves the necessity of fitting up a sulphurous acid apparatus expressly for the purpose, and conducting the gas through the solution for a considerable length of time before the chromic acid is completely reduced. When every precaution is taken, it frequently happens in this instance also, that a pink-coloured filtrate is obtained after the addition of ammonia.

In the course of an investigation I have made on the salts of chromium, I have found that chromic acid when free, or in combination with alkalies, may be *instantly* reduced to a sesqui-salt, by mixing with a cold or hot solution of one equivalent of a chromate a solution of three equivalents of *sulphite of soda*. The moment the solutions are mixed, the splendid green colour, peculiar to sesquichloride of chromium, is produced. To determine the chromium in bichromate of potash, I have adopted the following method. I take 1 gramme (15.433 grs.) of bichromate of potash dissolved in 100 cubic centimetres (about 3½ ozs.) of hot water, and add to it 35 cubic centimetres (about 1 oz.) of hydrochloric acid (made by diluting strong hydrochloric acid of sp. gr. 1.283, with an equal quantity of water). To this I add 3 grammes (46.3 grs.) of sulphite of soda dissolved in boiling water. The moment the solutions are mixed the reduction is effected. The change is represented in the following equation:—

$$KO, 2\,CrO_3 + 4\,HCl + 3\,(NaO, SO_2) = Cr_2\,Cl_3 + KCl + 3\,(NaO, SO_3) + 4\,HO.$$

To the solution is added as usual a very slight excess of ammonia and the precipitate of sesquioxide of chromium, which may be filtered immediately, can be washed rapidly, dried, and weighed. Several determinations made in this way gave results closely according with theory.

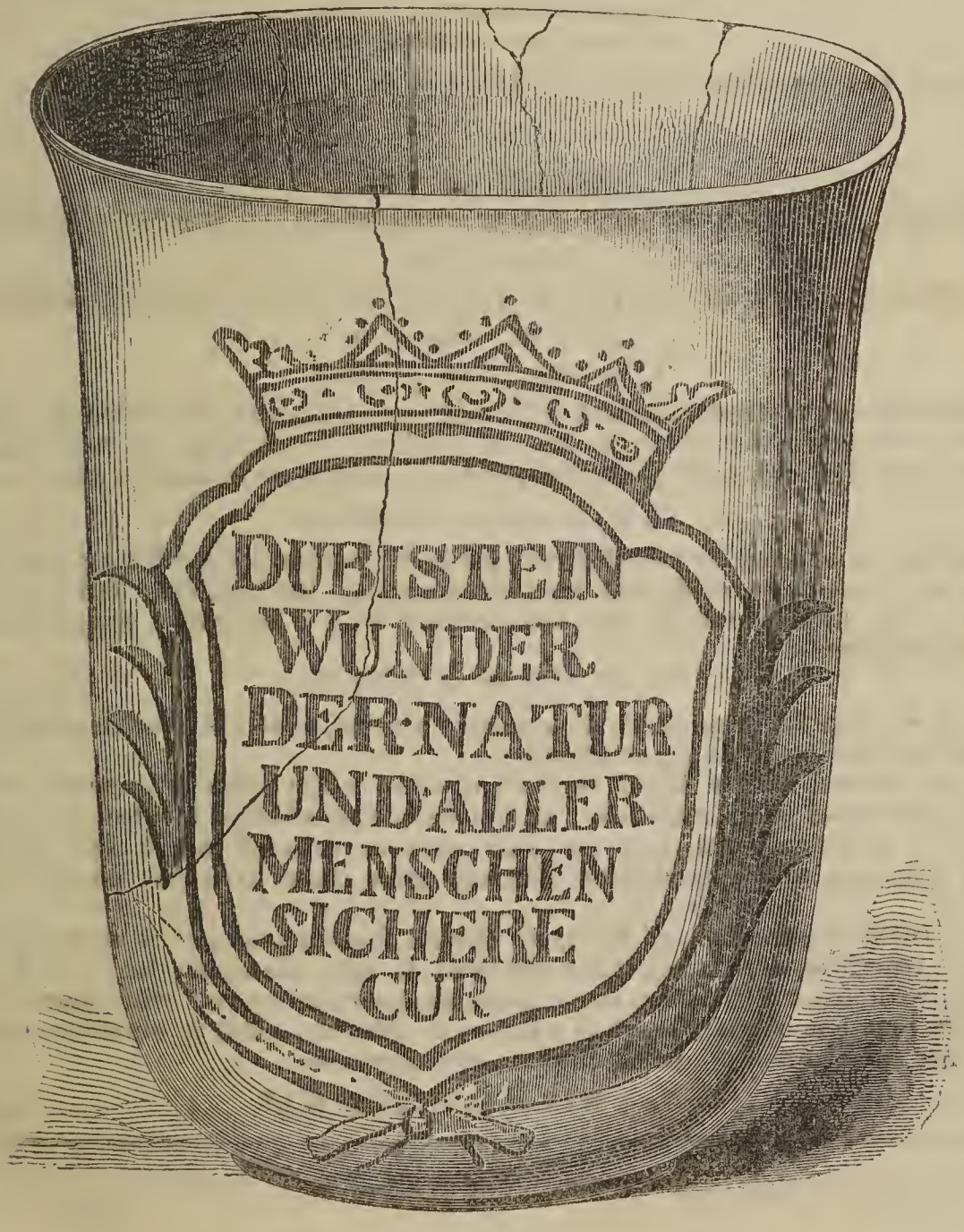
This method certainly is more expeditious, and appears to possess many advantages over the usual processes, and under these circumstances I have thought it would be of some service, especially to chemical students, to make it public.

NOTE ON POCULA EMETICA, EMETIC CUPS, OR CUPS OF ANTIMONY.

BY MR. REDWOOD.

Antimony, although known to the ancients and mentioned by Dioscorides and others under the names of *stibium*, *stimmi*, *barbason*, *albastrum*, &c., appears to have been first brought into popular use as a medicine by Basil Valentine and his followers in the 15th, 16th, and 17th centuries. Basil Valentine, in his "*Currus Triumphalis Antimonii*," included antimony among the seven wonders of the world, and ascribed to it extraordinary virtues. It was not, however, allowed to enjoy the reputation it thus acquired undisturbed; it was soon after-

wards condemned as a dangerous poison, and violent contentions prevailed for many years with reference to the use of antimony in medicine. To such a height was this controversy carried, that in 1566 a decree of the Parliament of Paris was issued against the use of antimony. The prejudice was so strong against it about this time, that an eminent Paris physician, Paulmier, was expelled from the faculty in 1609 for having administered antimony. A change of opinion afterwards took place, and antimonial wine was admitted by the faculty into the *Antidotarium*, published in 1637. It was much employed about 1650, although many medical men still considered it a poison, and strongly condemned its use. At length the doctors assembled in March, 1666, to the number of 102, to decide upon the merits of antimony; and a majority of 92 voted in its favour, upon which its use was authorized by Parliament in April of the same year. Among other forms in which antimony was used as a remedial agent, were those of pills and cups, made of metallic antimony. The former, called *Pilulæ æternæ seu perpetuæ*, owed their efficacy to whatever action was exerted upon the surface of the metallic globule during its passage through the intestinal canal, and as this caused no perceptible loss of weight in the metal, the same pill was used over and over again, and thus served for a whole family or community. To imaginative patients the antimony cups, *pocula emetica* or *calices vomitorii*, afforded a more agreeable mode of administration. These



cups are said to have been made of an alloy of tin and antimony. Wine being allowed to stand for some time in one of them, became impregnated with tartrate of antimony, from the action of the tartar contained in the wine upon the metal or the film of oxide formed upon its surface. Pills and cups of antimony were, no doubt, highly prized during the period when, notwithstanding the high opinion entertained by many of the virtues of antimony, the use and sale of the preparations of this metal were interdicted by law. An everlasting pill or a cup capable of imparting its virtues to the liquid contained in it, and which could be handed down from generation to generation, effectually set legislation at defiance. But *pocula emetica* have long ceased to belong to our Materia Medica, and are now only occasionally found in the cabinets of antiquarians. One of these cups was exhibited at the last *conversazione* of the Pharmaceutical Society in Bloomsbury Square, by Mr. Trenham Reeks, of the Museum of Practical Geology in Jermyn Street. It was purchased for *one shilling* at the sale of Mr. D. Falcke, in April last, at Messrs. Christie and Manson's, and was described in the catalogue as "An old white metal cup, with German inscription and coronet, gilt, in wood case." The annexed engraving represents this cup, of its real size, with the inscription, which may be thus translated:—

"Du bist ein Wunder der Natur,
Und aller Menschen sichere cur."

Thou art a wonder of nature,
And to all men a certain cure.

The cup has been deposited in the Museum in Jermyn Street.

REPORT OF THE

RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION,

AND OF THE

APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

BY B. H. PAUL, Ph.D.

(*Continued from p.* 624.)

Synthesis of Methyl-Alcohol.—Former investigations, conducted by M. Berthelot,* have shown that alcohols may be produced artificially, by combining the elements of water with such hydrocarbons as are analogous to olefiant gas:—

$$C_4 H_4 + H_2 O_2 = C_4 H_6 O_2.$$

This may be effected by two different methods: either by combining the hydrocarbon with sulphuric acid, and then decomposing the resulting substance with water; or by first combining the hydrocarbon with a hydrogen acid, in order to produce an ether:—

$$C_6 H_6 + H Br = C_6 H_7 Br.$$

By one or other of these methods, ordinary alcohol, and the alcohols with higher equivalents, may be produced artificially.

But the alcohol with a lower equivalent—the methyl-alcohol—cannot be prepared by either of these methods. M. Berthelot endeavoured to effect the artificial production of this alcohol, and for this purpose selected marsh gas, a hydrocarbon produced under conditions differing from those in which olefiant gas is produced.

The artificial production of methylic alcohol from marsh gas is based upon the following reactions, which might be expected to take place, but its execution was attended with great difficulties, since it was necessary to operate with gases.

By the reaction of marsh gas ($C_2 H_4$) with chlorine, there is obtained, together with other substitution products, chloride of methyl:—

$$C_2 H_4 + 2 Cl = C_2 H_3 Cl + H Cl.$$

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* *Comptes Rendus*, xlv., 916.

By a regulated decomposition of this ether, it enters into combination with the elements of water, giving rise to the production of hydrochloric acid and methylic alcohol :—

$$C_2 H_3 Cl + H_2 O_2 = C_2 H_4 O_2 + H Cl.$$

Several chemists have observed that in the reaction of chlorine with marsh gas, a gaseous chlorinated substance is produced ; but this substance has never been analyzed, or at all closely examined. It has frequently been assumed to have the composition of chloride of methyl, but that it was only isomeric with that substance, and not identical with it.

This is the substance which has served M. Berthelot for the artificial production of methylic alcohol. It was prepared by mixing forty litres of chlorine with an equal volume of marsh gas, purified by means of sulphuric acid, and exposing the mixture to the influence of irregularly reflected sunlight. When the mixture had become colourless, the flask in which it was contained was opened under mercury, and some fragments of caustic potash, with a few drops of water introduced. By this means the volume of gas was reduced to one-half. The residual gas contains the chloride of methyl, amounting to about one-third of this residue, the remainder consisting of unaltered marsh gas, and frequently some hydrogen.

The chloride of methyl was purified by shaking this gaseous residue with glacial acetic acid, in the proportion of 250 grammes to 8 litres ; then, after allowing the unabsorbed gas to escape by means of an inverted syphon, inserted into the flask, with its mouth dipping under mercury, the acetic acid was heated to the boiling point, and by this means most of the gas was disengaged. That portion which still remained in solution could be separated by neutralizing the acid with strong caustic soda. This gas is collected over mercury, and shaken with moistened fragments of caustic potash, for the purpose of separating the acetic acid vapour mixed with it.

In this way a gas is finally obtained, which has a peculiar odour, and burns with the characteristic green flame, producing hydrochloric acid. It dissolves in one-fourth its volume of water, one-thirty-fifth its volume of absolute alcohol, and one-fortieth its volume of crystallizable acetic acid. At 30° C. it condenses to a liquid, and in fact presents all the characters of chloride of methyl.

By the combustion of this gas it was found to yield an equal volume of carbonic acid, consuming nearly one and a half times its volume of oxygen :—

$$C_2 H_3 Cl + 6 O = C_2 O_4 + 2 H O + H Cl.$$

During this combustion, the mercury in the eudiometer was not sensibly affected.

The identity of this chlorinated derivative of marsh gas with the chloride of methyl was therefore proved, so far as regards physical characters and chemical composition. It only remained to confirm this evidence of identity, by converting it into methylic alcohol, and thus showing that its constitution was that of chloride of methyl. This conversion was effected by operating both with the purified gas and with the original crude product of the action of chlorine upon marsh gas. It was also effected in three different ways :—

1. The chloride of methyl was dissolved in acetic acid, and heated with acetate of soda to 200° C. In this way acetate of methyl was produced. But this method is not adapted for the production of large quantities.

2. When the chloride of methyl was digested for a week with a water solution of potash, at a temperature of 100° C., methylic alcohol was produced :—

$$C_2 H_3 Cl + KO + HO = C_2 H_4 O_2 = KCl.$$

By operating in this way with two litres of the gas, nearly two grammes of methylic alcohol was obtained, but a large portion of this substance was lost by reason of its volatility, and the large extent of surface of the vessels required for operating with the gas. It appeared therefore preferable to convert the methylated alcohol into a non-volatile compound that might be isolated by evaporating its solution, and which presented well-defined characters.

3. For this purpose the chloride of methyl was submitted to the action of a mixture of concentrated sulphuric acid, and sulphate of silver or of mercury, at a temperature of 100° C. Sulpho-methylic acid was produced. The simultaneous action of sulphate of silver and sulphuric acid appeared to be necessary, for these substances individually produced no sensible effect at a temperature of 100° C.

From the sulpho-methylic acid thus obtained, a baryta salt was prepared, and

obtained in a crystallized state with all its usual characters. From this salt it was easy to obtain methylic alcohol, benzoate of methyl, or oxalate of methyl, &c., by the ordinary methods.

These results show that marsh gas, $C_2 H_4$, can be converted into methylic alcohol, $C_2 H_4 O_2$, in the same manner that olefiant gas, $C_4 H_4$, can be converted into ethylic alcohol, $C_4 H_6 O_2$; or propylene, $C_6 H_6$, into propylic alcohol, $C_6 H_8 O_2$, &c.

However, while these latter alcohols are produced by the combination of the hydrocarbons with the elements of water, methylic alcohol is produced from marsh gas by the annexation of oxygen alone, in the same manner that allyl alcohol, $C_6 H_6 O_2$, is produced from propylene, $C_6 H_6$.

In connexion with these results, it may be mentioned that M. Berthelot has already succeeded in producing marsh gas by the direct combination of its elements. Consequently, methylic alcohol can, like ethylic, propylic, amylic, and other alcohols, be produced from a hydrocarbon, which may itself be produced artificially.

Sewage of Towns.—The official literature of this subject has received a further accession in the form of two reports—one on "The Main Drainage of the Metropolis," presented to the Metropolitan Board of Works by Messrs. Bidder, Hawksley, and Bazalgette; the other on "Sewage of Towns," being a preliminary report of the commission appointed in January, 1857, to inquire into the best mode of distributing the sewage of towns, and applying it to beneficial and profitable uses. The former report relates especially to the scheme of intercepting sewers, proposed to be adopted in the case of London, submitted by the Metropolitan Board of Works to the Commissioners of Her Majesty's Works and Public Buildings; and to the modifications of that scheme proposed by Messrs. Galton, Simpson, and Blackwell, the engineers, to whose consideration that scheme was referred by the First Commissioner of Works. It consists chiefly of a minute criticism of the modified scheme proposed by the Government referees, and, as the questions raised are mostly of an engineering character, it will be sufficient to give here the general results arrived at, viz.:—

That the plan recommended by the Government referees, for discharging the sewage into the sea near Mucking Lighthouse and at Higham Creek, is unnecessarily large, excessively costly, and, as a work of construction, all but impracticable; the chief objections to it being,—that the rainflow of 1.2 inches in twenty-four hours proposed to be carried off, is much greater than requisite; that the internal sewers necessary for the reception of such a rainflow would be extremely difficult and inconvenient to construct under the streets of London; that no means for effecting, *within* the metropolis, the dilution of the sewage with six times its maximum flow are suggested, although rainfall of that amount, assumed to be necessary for cleansing the enlarged sewers occurs only at distant intervals; that the outfall channels could not be drained off, because they respectively commence at three and four feet below low-water mark, and terminate at fifteen and sixteen feet below low-water mark; that, consequently, deposits would accumulate in these drowned channels and their open outfalls, extremely difficult and very expensive to remove; and that the water to be applied for the dilution of the sewage in the outfall channels would pen back the internal drainage to its own level.

At the same time, while it is stated that the scheme of the Metropolitan Board is adequate for the satisfactory drainage of London, and for the reasonable purification of the Thames, it is recommended, that the outfalls should be placed respectively at Barking Creek and near Crossness Point, in preference to either Sea Reach or Erith Reach; and that covered reservoirs of moderate size should be placed near each outfall, for the reception of the sewage until it is discharged during the first hours of the descending tide, or for the purpose of being defecated with lime or otherwise.

In addition to these more special features of the report, it contains some very important remarks as to the condition of the river Thames, and as to the influence of the discharge of sewage into rivers generally. Before referring to those remarks and the observations on which they are based, it will, however, be preferable to give a brief abstract of the views put forward in the report of the Royal Commission, which treats the subject in a more general manner.

The investigations of the Royal Commissioners have been in the first place directed towards obtaining a personal acquaintance with the existing condition of things as regards the disposal and application of sewage. In this way they have had abundant opportunities of establishing the fact, "that the present state of

sewage outfalls in many towns gives rise to nuisance and danger of a formidable character." It is pointed out that the evil arising from the discharge of sewage into rivers being a consequence of the abolition of cesspools and the introduction of water-closets, must be steadily progressive; that it is already sensibly felt, although these improvements are still but partial; and that in proportion as they are more generally introduced, together with a better water supply—when, in course of time, towns are more thoroughly sewered, the nuisance would be very materially increased if the present system of sewage discharge were permitted to continue. In that case, as the entire solid and liquid excrementitious refuse would be discharged, through the sewers, into the rivers in the state of a liquid totally different in character from the former sewage, and very much larger in quantity, all idea of resorting to rivers as a source of water supply, would have to be abandoned as revolting in the extreme. Many rivers, especially in the crowded districts of the North of England, pass through several towns in their course seaward, and receiving from each its complement of sewage filth, are even now little better than sewers themselves, although comparatively few of those places have yet carried out any complete works of water supply and sewerage.

The increasing offensiveness of the Medlock and the Irwell at Manchester, of the Mersey at Stockport, of the Tame at Birmingham, and of many other rivers, proves that an evil of national importance is fast growing up, which calls for immediate and serious attention, and urgently demands the application of remedial measures.

There may be instances in which the situation of a town admits of the sewage being discharged into a watercourse without its even remotely affecting any other population, but in a country thickly studded with centres of population, such cases are quite exceptional. Thus, for instance, the Tame, before reaching Birmingham, receives the sewage of a number of towns, containing a total population of not less than two hundred and twenty thousand persons. A small stream in itself, it may, without exaggeration, be said, during dry seasons, to contain, at Birmingham, as much sewage as water.

That such a stream, traversing a densely populated town, and exposing to the air a large surface of putrid liquid, must be very injurious to health, no one can doubt. But this is not all. It must be remembered that at Birmingham this river supplies water for all purposes, including the drinking water of no less than fifty thousand people. In many other cases, likewise, the inhabitants of a town are under the necessity of obtaining water from a river which, in its passage through densely populated districts, has received the filth of thousands and tens of thousands of human beings, together with various other equally disgusting additions contributed by the trades and manufactures carried on along its banks.

The Thames, which at a high point is supposed to yield a supply of pure water to London, receives above that point the sewage and drainage water of towns and villages containing more than seven hundred thousand inhabitants. In the majority of these places little or nothing has yet been done towards the improvement of the public health, but looking at the rapid extension of drainage operations, it will be readily conceived, that, in the absence of general measures to prevent the pollution of rivers, the state of the Thames will soon become seriously affected even by the sewage of these places alone.

Even in the absence of large towns within a moderate distance below the outfalls of sewers, the comfort and health of the inhabitants of small villages or hamlets and country residences situated on the banks of the streams polluted with sewage will be interfered with, and the value of their properties greatly deteriorated. Other evils of a less public but still important nature are caused by the pollution of watercourses, as, for instance, the destruction of fish: and in the case of the Scotch and Irish salmon fisheries, which represent property of large annual value, supporting a very considerable population, apprehensions are already entertained of serious injury resulting from the daily increasing quantity of sewage thrown into the rivers.

It is true that the influence of the air, of aquatic vegetation, of fish, &c., materially diminish the amount of offensive substance thus mixed with river water, but still as a matter of common sense and public decency it is not to be tolerated that the sewage of one town shall flow through, and still less be the source of the water supply to other places.

It is also a very unfortunate fact that the difficulty of dealing with sewage in such a manner as to escape the results of legal proceedings on account of the

contamination of watercourses, is reacting upon the introduction into towns of improved arrangements for water supply and drainage, in many places neutralizing, if not entirely suspending, the efforts of the authorities to carry into effect improvements which are known to be essential to the public health. In addition to this, their official inspections have confirmed the impression "that the successful prosecution of town drainage, and of other measures for the improvement of the public health, is in great measure dependent upon the satisfactory disposal of town sewage." With regard to this point, the investigations of the Commissioners have led them to the conviction that, in the case of London, there is no necessity for the construction of sewers with distant outfalls, but that sewage may be dealt with close at hand so as to remove its offensive and noxious properties.

Guided by these views, the Commissioners have therefore endeavoured to find a remedy for the evils arising from sewage discharge, which, while relieving town populations from nuisance, should, by an agricultural application of the sewage, avoid the waste of valuable material. At the same time it has been felt that the realization of the former object should not be at all contingent upon the success of the latter. As was pointed out by Mr. H. Austin, in his report to the Board of Health,* the great problem is to get rid of the sewage, advantageously to agriculture if it may be; if not, at the least expense to the community at large. With this view the Commissioners have examined the different localities where attempts have been made to obviate the injurious influence of sewage by special treatment, previous to its discharge into the watercourses; or to accomplish that object still more perfectly, by employing the liquid as manure. Among the places where sewage is directly applied to land, Rugby, Watford, Rusholm, Edinburgh, Mansfield, and Milan have been visited, as well as Croydon, Leicester, Tottenham, and Cheltenham, where works for the purification of sewage are in operation.

The examination of these places has led to the conclusion that the application of the whole sewage to land, with proper precautions, would not be objectionable on the score of nuisance or danger to health, and that, if judiciously carried out, it would be profitable.

With regard to those cases in which circumstances prevent the direct application of sewage to land, it is stated that the method of precipitation with lime, although it admits of only a small portion of the fertilizing value of the sewage being realized, will greatly ameliorate and practically obviate the evils of sewage discharge, especially where there are large rivers; and that by modifications of the existing methods, the works necessary for this purpose need not be a source of nuisance, such as has been apprehended to result from them.

It is added also that, while the magnitude of a town presents no real difficulty to the effectual disposal of its sewage, provided it be considered as a collection of smaller towns, the employment of one or other, or both of the above methods of disposing of sewage, must depend upon a variety of local circumstances, and that the case of each town must be considered specially; and it is recommended that with the view of devising general legislative measures, which might be safely adopted in reference to this subject, further investigation should be made of the state of sewer outfalls, and the condition of rivers in populous districts.

With regard to localities where, as in the case of Edinburgh, the application of sewage to land may be effected by gravitation, it is believed that there can be no doubt as to its value; and that if closed drains were substituted for open ditches as main channels, there would not be any cause for complaint of this use of sewage. For while the absorption of the offensive gases of sewage by the soil is so rapid, that there is no perceptible smell five minutes after the application, the liquid, after percolating the soil, would have its offensive characters removed, and might with propriety be thrown into any watercourse. This was found to be the case even at Edinburgh, where the soil through which the sewage percolates is little better than sand.

Even when it is necessary to adopt the more expensive method of pumping sewage on the land, or of collecting it in reservoirs during intervals when its application would be impracticable, remunerative results may be obtained by proper management; and on the whole, the commission believe that the sewage of a town can be more profitably disposed of by direct application to land, than by any other means.

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* *Report of Chemical Investigations relating to the Metropolitan Main Drainage Question.* July, 1857.

In recommending the treatment of sewage with lime, as applicable in some instances, it is admitted to be, like the method of filtration adopted at Cheltenham, only an inexpensive means of mitigating nuisance, that it does not effect the separation of more than one-fifth the valuable material of sewage, and that the liquid which results from the liming operation still contains a considerable amount of dissolved organic substance. The liability of the liquid to subsequent putrefaction, by which, it was suggested by Dr. Hofmann and Mr. Witt,* that it might again become offensive and dangerous to health during hot weather, is considered to be practically unimportant, but it is admitted that even this objection should be overcome, and the Commissioners are of opinion that the accomplishment of that object lies quite within the means of chemical science. At the same time it is considered that since by far the largest amount of nuisance and danger arising from the pollution of rivers by sewage is due to the solid suspended substance, the question is not whether the treatment of sewage with lime removes all possibility of further putrefaction in the liquid, but whether such treatment so far destroys the noxious character of sewage that it may be discharged into rivers without danger. This is believed to be the case with regard to the treatment of sewage with lime, which effects the separation of the suspended material. It is also shown that the erection of works for this purpose would obviate present nuisance, and give time for that change of opinion which will ultimately cause sewage to be sought after by agriculturists. Meanwhile, the possibility of nuisance, arising from the drying of the precipitated material, which is the chief objection to this method, might be prevented by removing the precipitated sludge at once through pipes on to land in the country. For carrying out this plan the area of land that would suffice would be much smaller than that requisite for the disposal of the entire sewage.

Hitherto the main difficulty in the way of deodorizing the sewage of London has been the insurmountable objection to the construction, within or near to the metropolis itself, of any usual form of reservoir and deodorizing works on the great scale required. To meet this difficulty, a plan has been devised by the Commissioners which, while especially providing against the discharge and deposition of the suspended material of sewage—the chief source of pollution of the Thames—would not only provide for reservoirs in such a manner as to be free from objection, but would also afford the means of realizing great improvements in other respects of which the metropolis is susceptible.

The chief feature of the proposed plan is the construction of the deodorizing works and reservoirs so as to form the foundation for a complete embankment of the river. Advanced terraces would be constructed, as shown in the accompanying plan, continuous on the surface, but affording at convenient distances, entrances (A A) to the inner basins and wharves, on the principle recommended by the Commissioners of Metropolis Improvement in 1844. In the interior of these lengths of embankment a series of separate reservoirs would be formed, into which the whole of the sewers now discharging directly into the Thames would have their outfall. The whole of the high level drainage—now such a source of mischief to the low districts—would be cut off by intercepting sewers, and conducted by gravitation to the reservoirs. The sewage of the low level districts would be raised by steam power. The suspended material would then be precipitated, and after its deposition the clear liquid would be discharged during the ebb tide and below low-water level.

The precipitated material would be pumped away in the state of sludge, and might be profitably employed upon land, and would be willingly received by many farmers who would object to deal with liquid sewage. The value of this sludge manure would be very great.

The sewage in these reservoirs would be always deodorized; there would not be any external opening in the shape of gullies for the emission of foul air, nor would offensive smell escape from them under any circumstances. By dividing the metropolis into several sectional districts, with separate outfalls, instead of attempting to deal with the sewage as one unmanageable whole, much of the difficulty and expense of the undertaking would be at once removed. The serious difficulties of construction, and the damage to buildings consequent upon the laying down of many miles of large sewer in most treacherous ground, and below low-water mark, as well as the possibility of the cost enormously exceeding the estimate, would be avoided, together

* *Pharmaceutical Journal*, xvii., 180.

with many other objectionable probabilities attaching to the plan of main sewer with distant outfalls. At the same time the plan is one that admits of future amplification, if, in course of time, the more complete application of sewage to land should be found profitable and become general.

Lastly, the plan proposed by the Commissioners would effectually secure the purity of the river and the improvement of the metropolitan drainage, without entailing any difficulties or inconveniences of its own. It would also improve the navigation and appearance of the river; furnish on the terraces opportunity for exercise and recreation to a large population remote from the parks, and supply a new thoroughfare from Queenhithe to Westminster on the north, and on the south opportunity for metropolitan railway communication.

The estimated cost of these works, exclusive of purchase of property and the working expenses of dealing with the sewage, is three and a quarter millions sterling, being far below the amount estimated as requisite for the works hitherto contemplated simply for conveying the sewage of the metropolis to Sea Reach, and discharging it uselessly into the sea.

With regard to the improvement in the condition of the Thames, so far as the appearance of the water is concerned, the Commissioners point out that, even if the entire sewage were diverted from the river, perfect purity could not be expected; and in the report presented to the Metropolitan Board of Works it is still more clearly shown that the Thames, with its rapid tide and enormous traffic, would still

remain a muddy river differing but little in appearanee from its present eondition. It seems to be admitted on all hands that the deposit of black mud on the banks of the river is by far the most serious evil resulting from the discharge of sewage into the Thames. In the report to the Metropolitan Board of Works, it is stated that this evil has already attained such proportions as to render it essential to the well-being of the metropolis that means should be taken for its immediate and permanent abatement. It is admitted that the construction of intercepting sewers would not alone be sufficient for its entire suppression, and it is believed that the only certain remedy for the nuisance, arising from this souree, will be found in the construction of an embankment extending on both sides of the river from Chelsea to London Bridge, and confining the river so as to ensure the covering of the bottom at all times of the tide. It is also considered that this measure, besides being advantageous in a sanitary point of view, would contribute greatly to the improvement of the metropolis in the manner pointed out by the Royal Commission.

One of the most important features of the report to the Board of Works is the prominence given to the opinion "that the condition of the flowing water of the river is not injurious to health," and that the influence of the sewage upon the physieal and hygienic condition of the Thames has not only been much mistaken, but also greatly exaggerated. This opinion is based upon the evidenee given by those who are best aequainted with the eondition of the river, and who have had the longest experienee of the habits and diseases of the river population of London. Thus Dr. Barnes, the senior physieian to the *Dreadnought*, states that this hospital will bear comparison with any on shore for general salubrity; that statistics do not show the prevalence of any peeuliar form of disease, or any increased general mortality among the population dwelling near the river. Similar testimony is given by Dr. Ward, also physician to the *Dreadnought*, by Dr. McWilliam, the medical officer to the Customs, and by the medical officers of the Thames Police Force. Mr. Busk, the resident surgeon to the *Dreadnought*, also states that he has never seen reason to suppose that the state of the river was productive of the least ill-effect, or that the London sewage affected the water to any appreciable extent. Altogether, this evidenee goes to disprove the assumed existence of deleterious emanations from the river.

These facts are considered to be consistent with the opinion entertained by the Board's engineers, that the operations of nature for the purification of corrupted water are so perfectly conducted, that not a particle of unwholesome sewage material can be detected within a few hours, or even a few minutes, after exposure to the destroying influence of atmospheric oxygen. It is stated that from the results of their own practice and experience in reference to the drainage of towns, they have long been aware of the important fact that those organie substances eommonly received from domestic drains into street sewers undergo changes, not necessarily of a putrefactive eharacter, in the course of which they are resolved into inoffensive eompounds. The elucidation of this change as given in the report is very far from being satisfactory or indeed intelligible in a chemical point of view, but as it is stated to have been observed that when ordinary sewage is mixed with ten or twelve times its volume of fresh water in a flowing stream, it eeases to have any tendency to run into putrefactive decomposition and is finally consumed by the oxygen of the atmosphere, it is unnecessary to consider the explanation given of the precise nature of the process. It is considered that the cleansing of streams may be safely entrusted to this agency whenever the volume of fresh water is great in comparison to that of the sewage discharged into it, and when the velocity of the current is considerable. In illustration of this view, referenee is made to the Mersey and other rivers in the manufacturing districts, where the Board's engineers state that they have remarked with wonder the rapidity of the oxidizing proeess by which the disgusting feculæ of towns are converted into pure and inoffensive substances. This appears strikingly at variance with the account given of these rivers by the Royal Commissioners, and it does not at all affeet the objeetion raised to the discharge of sewage into rivers that afterwards constitute the water supply of other towns. It surely cannot be meant because the water leaving Leicester of inky blackness, owing to the discharge of sewage, becomes beautifully pellucid before its arrival at Loughborough, that the inhabitants of the latter place have no grounds for objecting to the sewage of Leicester being discharged into the river from which they derive their water for domestie purposes.

In the case of London, indeed, and of towns where rivers do not constitute the water supply of other towns, the discharge of sewage might be tolerated, if it can be shown with perfect certainty that no evil would arise from it, and provided proper precautions were taken for keeping the bed of the river clean. But even if that were proved to the full satisfaction of all, it would still be a question whether the continuance of the practice of discharging the sewage of London into the river is one that could be justified, as consistent with public decency, or regarded as admissible, except as a temporary expedient. In addition to this consideration, there is the fact that the sewage of London represents a value as manure, of more than one million annually. It has, moreover, been shown, that sewage can be profitably applied to the fertilization of land, without necessarily giving rise to the least injurious result, as regards the sanitary condition of the locality where it is applied ; and all that now remains to be supplied with regard to that means of disposing of the sewage of London, is a specific plan of effecting it. This it may be hoped will be provided by the Royal Commissioners, when their final and complete report appears.

With regard to the intercepting sewer scheme, there is one point which is of very serious significance. The principal reason assigned by the Board's engineers for recommending the removal of the outfall of the sewers from Sea Reach to some higher point of the river, is their own experience that it is extremely undesirable in a sanitary point of view to cause sewage to become intermixed with sea water, especially under circumstances which will cause it to be brought up the river by the flood tide. Dr. Letheby points out in reference to this point, that experience has shown that whenever putrifying organic substance comes into contact with soluble sulphates, it decomposes them, and causes the evolution of sulphuretted hydrogen. In hot climates, as on the coast of Africa, where the water of the rivers, highly charged with organic substance, mixes with sea water, this decomposition takes place ; and it was believed by the late Professor Daniell, that the malignant fevers common to the African coast were due to the influence of the miasm thus produced. On this account Dr. Letheby seriously advises that the scheme of discharging the sewage at a point low down the river should be abandoned, as likely to be attended with great danger to the public health. If this is really to be apprehended, the purification of the Thames from sewage in and near London, by discharging the sewage at Sea Reach, would be purchased much too dearly, even if it could be attained by that means.

The probability of such a result as that apprehended by Dr. Letheby taking place, may be regarded as proportionate to the amount of sulphates in the water, where the sewage is discharged, as shown by the following table :—

Constituents per gallon.	Higham Creek.	Tilbury.	Rainham Creek.	Barking Point.	Woolwich.	London Bridge.
HIGH WATER.						
Dissolved { Mineral ...	1780.4	1543.4	1129.6	849.3	443.5	20.8
Dissolved { Organic ...	2.7	3.1	2.8	3.0	2.9	1.9
Suspended { Mineral ...	1.9	9.1	12.4	5.7	5.5	2.7
Suspended { Organic ...	0.3	0.8	1.4	0.5	1.7	1.1
Total.....	1785.3	1556.4	1146.2	858.5	453.6	26.5
Combined sulphuric acid	113.19	100.84	73.75	55.25	30.18	3.14
LOW WATER.						
Dissolved { Mineral ...	1271.1	1196.2	233.8	100.6	46.8	18.3
Dissolved { Organic ...	3.4	3.8	3.0	2.8	2.9	1.6
Suspended { Mineral ...	1.8	21.7	7.7	6.6	9.3	3.9
Suspended { Organic ...	0.2	3.2	1.5	1.0	1.6	1.1
Total.....	1276.5	1224.9	246.0	111.0	60.6	24.9
Combined sulphuric acid	89.98	84.09	20.24	10.29	6.89	2.64

It is evident from this table, that although the discharge of the sewage at Barking would be less likely to cause evil results by the decomposition of sulphates than if it were discharged at Erith or at Sea Reach, still, the probability of such results being produced is very much greater at Barking than at London Bridge; and it also appears that in proportion as the sewage were to be discharged lower down the river, so as to fulfil Sir Benjamin Hall's interpretation of the Metropolis Local Management Act, as to "preventing all or any part of the sewage" from flowing or passing into the Thames in or near the metropolis, the danger incurred, from the decomposition of sulphates, would be increased very considerably. It seems, therefore, that so long as the sewage continues to be discharged into the Thames, the preferable alternative is to take advantage of the purifying influence of the fresh river water to the fullest extent, by allowing the sewage to be discharged directly from the present sewers in small streams, at different parts of the river, rather than to carry it collectively through close sewers even so far as Barking, and thus precluding the possibility of such purifying influence being exercised until after the sewage had been discharged at that point, and when the probability of other evils had been so greatly increased. Of course the adoption of this plan presupposes that the evidence brought forward to disprove the assumed influence of Thames emanations, is quite adequate and trustworthy. It would also involve the adoption of efficient means, to prevent the deposition of black mud on the banks of the river, as well as any other objectionable result of the present mode of discharging the sewage. For effecting this, the embankment of the river is admitted by all who have examined the subject, to be the most desirable measure that has yet been proposed; and at the same time every addition of facts relating to the subject of sewage, renders the intercepting scheme more and more questionable in every point of view.

ON A NEW ACTION OF LIGHT.

BY M. NIÈPCE DE ST. VICTOR.

(Communicated to the Académie des Sciences by M. Chevreul.)

Will a body which has been subjected to the influence of light or insolation, preserve in darkness any effects (impression) of this light?

Such is the problem that M. Nièpce attempted to resolve by means of photography. The phosphorescence and fluorescence of bodies are known, but the following experiments have never been made until now. An engraving which had been kept for several days in darkness was exposed during a quarter of an hour to the action of direct solar rays, one half being covered with an opaque screen. The engraving was then laid upon a sheet of very sensitive photographic paper, and put in a dark place for 24 hours, and on being examined, it was found that the white portions of the engraving which had not been protected by the screen during its exposure to the sun, had been reproduced in black. When the engraving was kept in profound darkness for several days, and then applied to the paper without being previously exposed to the sun, no result was produced.

Certain engravings after being exposed to the action of light reproduce themselves better than others, according to the nature of the paper; but all papers, even Swedish filtering-paper with or without water-mark, reproduce themselves more or less after a preliminary exposure to the light. Wood, ivory, gold-beater's skin, parchment, and even the living skin, are also perfectly reproduced under the same circumstances; but not so metals, glass, and enamels. In exposing an engraving to the solar rays for a very long time, it becomes, if one may use the term, saturated with light. In this way it produces the maximum of effect, provided that it is suffered to remain in contact with the sensitive paper, in darkness, for two or three days.

M. Nièpce has in this way obtained intensities of impression which induce him to hope that by using exceedingly sensitive paper (that for instance prepared with the iodide of silver, or upon a layer of dry collodion or albumen), and developing the image with gallic or pyrogallic acid, a sufficiently strong proof may be obtained to form a negative; which would be a new method of reproducing engravings.

If a sheet of glass be interposed between the engraving and the prepared paper, no impression is produced. It is the same if a sheet of mica be substituted for the glass, or a sheet of rock crystal, or a yellow glass coloured with the oxide of uranium.

An engraving covered with a layer of collodion or gelatine is reproduced, but not if it be covered with picture-varnish or gum.

An engraving placed at a distance of 3 millimetres from the prepared paper is reproduced very well, and if it be a bold design, it is reproduced at a distance of one centimetre. The reproduction therefore is not the result of contact or chemical action. All the parts of an engraving coloured with different colours are not produced with the same intensity; they vary according to the chemical composition of the colours: the same may be said of different kinds of inks. Vitrified characters traced upon a plate of varnished or enamelled porcelain are reproduced, but the porcelain leaves not the faintest trace; but if the porcelain be free from varnish or enamel, it leaves an impression, though a faint one.

If, after having exposed an engraving to the light for an hour, it is placed in contact with a piece of pasteboard which has been kept in a dark place for some days previously, and at the expiration of not less than 24 hours the pasteboard be brought into contact with the prepared paper, and allowed to remain thus for another 24 hours, the result will be the reproduction of the engraving—a little fainter, it is true, than if the engraving had been applied directly, but still distinct. Likewise, if a tablet of black marble dotted with white spots be exposed to the light, and then applied to the prepared paper, the white spots alone will produce an impression. Under the same conditions, a tablet of white chalk will leave a visible impression, whereas one of black charcoal makes none whatever. A black and white feather exposed to the sun, and applied in the same manner, produces the same results.

The following is the result of various experiments made by M. Niépce upon cloth of different kinds and colours. White cotton produced an impression upon the prepared paper. Cotton dyed brown by means of madder and alumina produced none. Cotton dyed of a violet colour with madder, alumina, and salt of iron, produced a very faint impression. Cotton dyed red with cochineal, or dyed Turkey red with madder and alum, produced none. Cotton dyed with Prussian blue on a white ground: the blue gave the deepest impression. Cotton dyed with indigo produced none. Cotton dyed of a chamois colour by the peroxide of iron produced an impression.

Linen, silk, and woollen fabrics likewise give different impressions, according to the chemical nature of the dye used.

The author drew particular attention to the following experiment, which is perhaps the most curious and the most important. He took a metal tube (any other opaque substance in the form of a tube answers the same purpose) closed at one of its extremities, and lined with white paper or cotton, and exposed the open end to the direct solar rays for about an hour; after the insolation he applied the same end to a sheet of prepared paper, and found after the lapse of 24 hours that the area covered by the tube had been darkened. More than that, an engraving on Chinese paper interposed between the tube and the prepared paper, was itself reproduced.

If the tube be hermetically closed immediately on being withdrawn from the light, it will preserve for an indefinite period the power of radiation communicated to it by insolation.

A piece of white card placed in a dark room into which an image vividly illuminated by the solar rays was thrown, was found after a three hours' exposure to give a faint representation of the object upon the prepared paper, after 24 hours' contact.

It remains only to speak of the result of experiments made with fluorescent and phosphorescent bodies:—A design traced upon a sheet of paper with a solution of sulphate of quinine (one of the most fluorescent bodies known), and exposed to the sun, then placed in contact with the prepared paper, will reproduce itself in a much more intense black than the paper on which it is traced. A sheet of glass, however, placed between the design and the prepared paper, prevents any impression from being produced, nor will any impression be produced if the design be not exposed to the action of the sun previous to contact.

A luminous design traced with phosphorus upon a sheet of white paper, will, without previous exposure to the light, act very quickly upon the prepared paper, but not through glass.

M. Niépce concludes his paper, which was received with a lively interest by the Academy, thus:—"Such are the principal facts I have observed. I have not space to enumerate all the experiments I have made; there are many others to be made; therefore I hasten to publish this paper without waiting to complete it. I may be

permitted, I hope, to believe that my new discoveries of the properties of light, scarcely suspected or imperfectly verified up to the present, will excite the attention of natural philosophers and lead to important results."

[The following is the substance of a second communication made by the same author:—]

There are two ways of proving the action exercised by light upon bodies subjected to its influence. The first, that which I described in a previous paper, consists in exposing to the sun, or even to the diffused light of day, an engraving or design of any kind, which is afterwards placed in contact with sensitive paper prepared with chloride of silver. The second, which I will proceed to describe, is more conclusive still.

You take a sheet of paper from a place where it has been until then in total darkness; a photographic slide upon glass or paper is placed upon it; you then expose it to the solar rays for a space of time varying according to the intensity of the light, after which it is again replaced in obscurity. You take up the slide which covers the paper, which is then to be treated with a solution of nitrate of silver; and in a very short space of time an image will be seen to appear, which merely requires to be well washed in pure water to fix it.

If it is desired to obtain a picture more rapid in its development and more luminous, the sheet of paper must be previously impregnated with a substance which is susceptible in a higher degree than itself to the luminous action referred to in this memoir—an action of storing up, if I may so express myself, with persistence of the luminous activity.

A very efficacious substance of this kind is an aqueous solution of nitrate of uranium, which can be obtained either by treating the oxide of uranium with diluted nitric acid, or by dissolving the crystals of nitrate of uranium in water.

The sheet of paper ought to be impregnated with the salt of uranium sufficiently to give it a perceptible straw colour; it must then be dried, and secluded from the light. When it is desired to use it, it must be covered with a slide, and exposed to the sun for about a quarter of an hour; it must then be withdrawn from the light; then treated with a solution of nitrate of silver, and a very vigorous positive picture will appear instantaneously, with the maroon tint of ordinary proofs. To fix it, it is only necessary to immerse it in pure water; the water dissolves all that portion of the salt of uranium which, protected by the blacks of the slide, has not received the action of the light, and the picture is fixed. If, after having well rinsed the proof in pure water, it is desired to make it turn black, it is only necessary to treat it with a solution of chloride of gold. The same result may be obtained in the following manner:—By immersing the proof, directly after exposure to the light, in a solution of bichloride of mercury, in which it must be left for some minutes only,—a few, more or less, according to the time of exposure (which should be three times as long as in the first case, or when made to change colour by means of an acid solution of chloride of gold); it must then be rinsed in pure water, and treated with a solution of nitrate of silver, in which it must be left until the picture is entirely developed with fine tones of ebony black; it must then be rinsed in pure water to fix it.

If, after the insolation or exposure to the light, a solution of acid chloride of gold be substituted for the developing solution of nitrate of silver, the image will be seen to appear instantaneously of a very intense blue colour; it is likewise fixed by washing in pure water.

Negative proofs to serve as plates may also be obtained by placing in the camera a sheet of paper impregnated with a solution of nitrate of silver; but, under present circumstances, this process is very slow, and will only serve for taking views of monuments.

The photographic pictures with a salt of uranium combined with salt of gold, of silver, or mercury, resist, without disappearing, the energetic action of a boiling solution of cyanide of potassium: aqua regia alone can alter them. Everything, therefore, leads to the hope that pictures taken in this way will be much more stable than the photographs taken by the present process, and that this new mode of printing positives, so very simple and rapid, is the sought-for solution of the important problem of the absolute fixing of photographic pictures.

The solution of uranium may be replaced by a solution of tartaric acid. The picture will also develop itself if we treat the insolated paper with the solution of nitrate of silver, but more slowly, unless the action of a temperature of 30° or 40° C. be made to intervene. The elevation of temperature, useful only when the developing agent is a salt of silver, becomes absolutely essential when it is desired to develop with the salt of gold. The heat in this case performs the function of an exciting agent, and it shares this property with other natural agents—humidity, for example, as I shall soon show.

A design traced upon a sheet of cardboard, with a solution of nitrate of uranium, or of tartaric acid, exposed to the light or insolated, and applied upon a sheet of sensitive paper, imprints its image, and an image much more intense than when the design was traced, as in my first experiments, with the sulphate of quinine. I believe even that I am able to affirm, after new and numerous experiments, that if with the sulphate of quinine I have obtained somewhat intense images, it is because I operated with a sulphate dissolved in tartaric acid; for if we operate with a solution of sulphate of quinine dissolved in nitric or sulphuric acid, the images obtained are weak and superficial.

If the design made on the cardboard with the solution of uranium or of tartaric acid is traced very boldly, it will be reproduced without actual contact with the sensitive paper, especially if the temperature is somewhat high. The following experiments show how great the influence of heat is:—In covering with a metallic plate heated to 50°, the *ensemble* of the cardboard which bears the insolated design, and the sensitive paper prepared with the chloride of silver, I have seen the image appear in a few minutes, while it would have been necessary to wait two or three hours if the temperature had been zero to see a light impression make its appearance, and twenty-four hours or more to obtain the maximum of action. I have taken two pieces of the same sensitive paper; I placed one on a metallic plate heated to about 60° C., the other upon marble at the temperature of zero; and I have observed, in the same conditions as to light, the piece placed upon the heated plate to blacken much more quickly than the piece placed upon the marble.

I repeated with the papers or cardboards impregnated with uranium or tartaric acid my first experiments relative to the storing up of light in tubes, and I obtained results much more striking, especially with the tartaric acid, which reduces less easily than the uranium the salts of gold and silver, but which at the same time gives a stronger radiation.

I expose to the solar light a sheet of cardboard very strongly impregnated with two or three layers of a solution of tartaric acid, or of a salt of uranium; after the insolation, I line the interior of a tin tube, of moderate length and narrow diameter, with the cardboard; I close the tube hermetically, and I find that after a very long lapse of time the cardboard acts upon the sensitive paper prepared with the chloride of silver, the same as on the first day. At the ordinary temperature of the air, twenty-four hours is necessary to obtain the maximum of effect; but if, after having injected a few drops of water into the tube, so as to slightly moisten the paper, it be re-closed, exposed to a temperature of 40° or 50° C., then opened, and its open end applied to the sheet of sensitive paper, a few minutes suffice to obtain a circular image of the opening as vigorous as if the sensitive paper had been exposed to the sun. The experiment succeeds but once—that is to say, the light seemed to have entirely escaped from the cardboard; and to obtain a second image, it is necessary to have recourse to a fresh insolation.

The salts of uranium are very fluorescent, as Mr. Stokes has discovered, and the crystallized nitrate of uranium is, in addition, very phosphorescent by percussion; but I have verified with the electric lamp that pure tartaric acid is not at all fluorescent, or that it does not become luminous under the action of the more refrangible rays of the spectrum obtained with the electric light, or under the action of solar light; it has been equally impossible for me to discover any phosphorescence of the crystals of tartaric acid. It is not then to phosphorescence or fluorescence alone that we can attribute the remarkable property which the solutions of uranium and tartaric acid possess of in some way saturating themselves with light.

I have coated pieces of cardboard with many different substances, and obtained very variable results. With some, the difference of impression between the insolated portion and that which has not been insolated, when both have been treated with a solution of nitrate of silver, was very great; with others the difference was scarcely

sensible; finally, with others the difference was inappreciable; nevertheless they receive impressions very rapidly under the influence of light.

I will cite in the first category, citric acid, oxalic acid, sulphate of alumina, citrate of iron, the iodides and bromides, arsenious acid, neutral tartrate of potash, lactic acid, and the animal skin, which participates the properties of the salts of uranium and tartaric acid.

In the second category, the sulphate of quinine, the alcoholic tinctures of nettle (chlorophyll), of *Datura stramonium*, of Curcuma, the infusion in cold water of the bark of the horse-chestnut tree (æsculine), sugar, collodion, gelatine, and starch.

In conclusion, I have thoroughly verified that the bodies which best preserve the activity which insolation gives them, are, except the salts of uranium, the least disposed to *fluorescence.*

In the third category, the chlorides, the acetate of morphia, and the phosphate of ammonia, which, under the developing action of the nitrate of silver, give very pure black tones; prussic acid, quinate of lime, and morphine, which give maroon browns.

The experiments I have described in this paper demonstrate, I believe, in the plainest manner, that light communicates to certain substances it has fallen upon a real activity; or better, that certain bodies have the property of storing up light in a state of persistent activity.

The quantity of persistent activity is more or less, according to the nature of the substance, the greater or less duration of the exposure, the atmospheric circumstances under which the exposure takes place, &c. It has its limits—that is to say, it gives to each substance a maximum of activity, and when that is attained, prolonged insolation adds nothing more.

A body having become active from insolation, preserves for more than a day, if kept in obscurity and exposed to the air, the faculty of acting on the salts of gold and silver; it will gradually lose this property; but it may be restored to it by a new insolation, provided always that the substance has not been altered in its chemical composition, as, for example, iodides and bromides are.

The paper impregnated with nitrate of uranium presents the remarkable property of colouring under the influence of light; if placed afterwards in obscurity for some days the colour disappears, to return again if exposed to the light anew; it reduces the salts of gold and silver while it is coloured.

The persistent activity communicated to a body by the light, acts not only upon the salts of gold and silver, but upon several of the organic and inorganic substances which light affects or modifies by its direct action.

Thus a body rendered active by insolation will transmit this activity by contact and in obscurity to another body, tartaric acid for example.

The bichromate of potash becomes, under this same influence, insoluble in water, as it becomes by its exposure to the sun; but heliographic varnish, and the resin of guaiacum, resist the persistent activity of paper impregnated with the salts of uranium or tartaric acid, and insolated.

I propose to examine in ulterior experiments whether the persistent activity will determine the combination of chlorine and hydrogen; whether it is acquired in the luminous vacuum, &c. &c. An engraving wetted and insolated reproduces itself very well on the sensitive paper, but if it be covered by a film of water (quelques millimètres) it does not do so, even in a solution of a salt of uranium or of tartaric acid.

Gelatine mixed with a salt of uranium, and exposed to the light, becomes insoluble, as if it had been mixed with bichromate of potash.

I have verified this remarkable fact, that the white of an engraving impregnated with salt of uranium or tartaric acid, and insolated, imprints itself very well upon sensitive paper prepared with chloride of silver, without the blacks leaving the least trace of any action. The same may be said of a design traced in *watery ink*, and of a sheet of paper blackened with lampblack. It will be interesting to study the action of the solar spectrum upon a card impregnated with tartaric acid, which is not fluorescent, or does not become luminous under the influence of the ultra-violet or invisible rays:—which rays, after the insolation, will imprint their image most strongly, the more or the less refrangible? Time will show.

The photographic proofs I have the honour to present to the Academy have been made by M. Victor Plumier, a very able photographer; he succeeded on the first

attempt in the application of my new process for printing positives, which induces me to hope that this process may be brought into practice without trouble, and will constitute an advance greatly desired.

Perhaps you will allow me to point out, in conclusion, a mode of reproducing engravings with the aid of the vapours of phosphorus, which, as I stated in a memoir published in 1847, have the property of attaching themselves to, and condensing themselves upon, the blacks to the exclusion of the whites.

The engraving to be copied is exposed to the vapours of phosphorus burning slowly in the air,—the blacks alone saturate themselves with phosphuretted vapours; then applied upon a sheet of sensitive paper prepared with chloride of silver; after remaining in contact a quarter of an hour, the engraving is represented upon the paper by a design formed of phosphide of silver, which, when it is sufficiently vigorous, resists the action of chemical agents diluted with water. The best mode of operating consists in placing the engraving in a box in front of a card, the surface of which has been sufficiently rubbed with a stick of phosphorus, and which lines one of the sides of the box: it is necessary to rub anew at each operation, because if the phosphorus is red it produces no effect: a film of water a centimeter or more in thickness does not arrest the deposit, or the action of the vapours of phosphorus upon the sensitive paper; the action exercises itself even through "Chinese paper," that is to say, if an engraving on paper of that description be placed against a sheet of sensitive paper, and the whole placed in the box in front of the phosphorescent side, a negative image of the engraving will be obtained, as if the blacks had acted as a screen, and the whites alone had given a passage to the vapours of the phosphorus which acted upon the sensitive paper. Nevertheless, if the exposure be too much prolonged, the blacks will in their turn imprint themselves, and will even predominate.

The vapour of sulphur produces analogous effects, and gives a reproduction of the print designed with the sulphide of silver, but the picture is not very stable.—*Journal of the Photographic Society.*

ICE MAKING.

A PATENT was taken out some time since by Mr. Harrison, of Victoria, for the making of ice, or rather, following the title of the patent, "for producing cold by the evaporation of volatile liquids in vacuo, the condensation of their vapours by pressure, and the continued re-evaporation and re-condensation of the same materials."*

The invention consists in producing cold by the evaporation of a liquid in one vessel, the withdrawal of the vapour formed, and the getting rid of the heat thus withdrawn by the condensation of the vapour in another vessel, such condensation being effected by pressure, and the heat given out during such condensation removed by the vessel being surrounded by water, the condensed liquid being again available for evaporation; the whole process being conducted in vacuo, that is to say, the liquid and vapour being isolated from the pressure of the atmosphere. The evaporating vessel may be of tinned copper, or any air-tight and water-tight material of good heat-conducting power, capable of resisting the atmospheric pressure, and not acted upon by the substances in contact with it, and of any shape, provided there be a sufficient surface of contact respectively to the liquid to be evaporated and the substance to be cooled. In like manner the condensing vessel may be of any material and shape, the requisites of strength, conduction of heat, resistance to chemical action, and sufficient surface, being attended to.

The apparatus by which the vapour is to be withdrawn from one vessel and forced into the other, may consist of a double-acting air pump, a double-acting pump with a piston of a half drum or gasometer shape working freely in an annular space filled with mercury; a blowing fan enclosed in an air-tight vessel, or a series of blowing fans; or the vapour may be forced under a head of mercury, and delivered on the other side of a partition, where the mercury is kept at a lower level by the increased tension of the compressed vapour, by means of a diving bell, a reversed archimedean screw, that is to say, a screw in which the spiral turns in the opposite

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* The apparatus referred to in the patent is described and figured in vol. xvi., page 447 of this Journal.

direction to that in which it would raise water, so that it scoops in and carries down the vapour and delivers it behind the partition; or by a reversed overshot wheel; or generally the vapour may be depressed by reversing any of the ordinary means whereby liquids are raised.

As this invention is applicable to the production of various degrees of cold by the evaporation of any volatile liquid, it is impossible to specify the dimensions of the various parts of the apparatus suitable for the endless variety of conditions under which it may be worked. Mr. Harrison supplies the following data for the calculation of dimensions as a guide to persons conversant with the leading principles of heat, and the chemical and mechanical properties of the substances made use of or operated upon.

The requisite surface of the evaporating vessel, he says, may be deduced from the ascertained fact, that a surface of ten square feet will evaporate fully 1 lb. water per minute, with a difference of temperature of 30°; with a less difference a proportionately larger surface will be required. The latent heat of other liquids being less than that of water, a less surface will suffice for their evaporation. For instance, the latent heat of ether at, say 24°, is to that of steam at 212° as 200 to 1000, nearly, therefore, only one-fifth of the surface, or one-fifth of the difference of temperature, will suffice for the evaporation of ether. The same rule will apply to the condensing vessel; but as no loss except of space can accrue from having the vessels much larger than is by calculation necessary, it will be well to make them of ample capacity and surface.

The method of ascertaining the dimensions of a pump to withdraw and compress a given quantity of vapour in a given time and at given temperatures, and of the power required to work such pump (in addition to the loss accruing from friction and the power required to overcome the weight of the valves, &c.), may be illustrated by the following calculations for an ether-evaporating apparatus:—It has been ascertained by experiment that 100 cubic inches of air weigh 31 grains, so that one pound of air occupies 22,580.6 cubic inches. The vapour of ether at 96° is of specific gravity 2.56, so that one pound of it occupies 8,820.55 cubic inches. The force or tension of ether vapour at (say) 24°, is equal to 4.8 inches of mercury, and as the specific gravity is proportional to the tension, one pound of vapour will occupy 55,125 cubic inches. But a condensation takes place on account of the lowness of the temperature amounting to $\frac{1}{480}$ of the volume at 32 for each degree. Corrected by this amount, one pound of ether vapour at 24° occupies 47,935 cubic inches. To withdraw and condense this quantity per minute, a pump of, say, 500 cubic inches capacity, making 48 strokes, would be required. The power required to work such a pump is the difference of tension between the vapour at the temperature of evaporation and its tension at the temperature of condensation; thus, the tension of ether vapour at, say, 24°, being equivalent to 4.8 inches of mercury, and its tension at, say, 74° being equivalent to 16.1 inches, the power required to raise vapour at the former and condense it at the latter temperature, will require to be sufficient to overcome a tension equal to 11.3 inches of mercury. As, however, the vapour of ether under a pressure of 16.1 inches occupies only .32 of its volume at 24°, the full power will not be required until the vapour has acquired the full density, and only one-half of the power will be required to reduce the volume of vapour at 24° to its volume at 74°. The power therefore required to raise one pound of ether at 24° and condense it at 74°, is equal to the compression of 15.520 cubic inches (the bulk of the vapour at 74°), $+ \frac{47935-15520}{2} = 31,722.5$ cubic inches, with a weight of 11.3 inches of mercury, or about 5.7 lbs. per square inch.

It is impossible, without the aid of drawings, to give a more detailed description of the invention. The inventor does not, however, confine himself to the use of the special arrangements of apparatus described in his patent, but he claims in his invention the use of volatile liquids (including water) evaporated in vacuo, and reduced to the liquid form in a separate vessel by pressure, for the production of cold and in the manufacture of ice, and, generally, in all processes where refrigeration is requisite or desirable. An apparatus, driven by a steam-engine of 10-horse power, has been erected, and successful experiments were publicly made in the working of the invention, previous to the exportation of this apparatus to Australia. The question to be solved is not whether ice can be made by the machine—of that there is no doubt whatever—but at what cost. Experience alone will determine this.—*Journal of the Society of Arts*, June 4, 1858.

PLATINUM OF BORNEO.

(*Communicated by* PROFESSOR S. BLEEKRODE, *Royal Academy of Delft.*)

SEVERAL authors on the statistics of metal mention Borneo as a source of the valuable metal Platinum, so much required in the chemical and industrial arts. There are some who calculate that Borneo can produce from 250 to 400 kilograms yearly. It is surprising, but not the less true, that up to the present time the collection of platinum there has been almost neglected.

In 1831, the resident of Banjarmassin, Mr. Hartman, found the platinum scales in the gold sands, and Dr. L. Horner has confirmed it for all the gold sands that are worked in the valleys of the Ratoes mountains of the Laset district. The observations of this much-lamented naturalist soon found their way into the European journals, having been communicated by Leopold von Bach to Humboldt, who called it "Eine bis jetzt wenig bekannte Erscheinung" (*Central Asien*, 1843, p. 365).

Dr. Horner estimated the amount of platinum in the gold sands of Borneo as one of platinum to ten of gold, and in this proportion he calculated the eventful produce of that island at 300 kilograms (six cwt. per year), and this could possibly be augmented.

The existence of platinum was afterwards confirmed by other naturalists of the Dutch government. Dr. S. Muller, who visited the southern district of Borneo, has given a description of the diamond mines of Martapoera; after the separation of the diamonds by washing the sands, there remain gold and platinum scales; the gold is carefully collected, but the platinum is rejected as valueless, under the name of *mas kodokh* (gold for the frogs), because neither the Chinese nor the natives know how to work it.

Dr. Schwaner, who travelled through the district of the river Barito and the south-eastern country, during 1843-47, has given an accurate description of the geological position of the three very valuable minerals, diamonds, gold, and platinum, as they are associated together in the diluvium of that island. It appears that the same kind of diluvial *débris* from the rocks of the mountains and hilly districts is found, but the relative proportions of the three valuable minerals in it are very different. Where the diamonds are numerous, gold and platinum are scarce, and, on the contrary, where the grains of the noble metals are abundant, the diamond is rarely found. Gold and platinum are also dispersed over a larger area than the diamonds. The diluvial deposits lie superficially in the higher districts of the rivers and their mountain tributaries; in the lower country the diluvium is covered by the more recent alluvial deposits of the marshy grounds near the coast. The diluvium consists of conglomerates and rock fragments of diorite, syenite, gabbro, quartz in different colours, but the milky quartz is more general; the minutest parts are quartz sand and magnetic iron-sand. The thickness of the diluvial stratum varies between a few feet and as many fathoms. The depth below the surface is likewise very variable and irregular. The subsoil is a kind of loam, the thickness of which is not yet ascertained.

It is very remarkable, that in some districts the platinum ore contains grains of *cinnabar*, especially at Playhary. We have stated above that the proportion between gold and platinum is as 10 : 1; but this relation is very variable, because at Katapan it is 5 : 1, at Soengi Matjan 20 : 1.

Last year I received a sample of the Borneo platinum ore, which is now beginning to attract the attention of our commercial society. The results of my analysis are as follows:—

PLATINUM ORE OF BANJARMASSIN.

Separated by solution in hydrochloric acid.	Iron oxide and iron	1.13
	Copper	0.50
Osmium		1.15
Gold		3.97
Platinum		70.21
Iridium		6.13
Palladium		1.44
Rhodium		0.50
Iron		5.80
Copper		0.34
Insoluble in aqua regia: Osmiridium and minerals		8.83

The osmium was separated by distillation as described by Berzelius. The analysis was executed, following the method of Berzelius and Claus (*Beiträge zur Chemie du Platin metalle*, 1854). The method of Claus is highly commendable for the ease with which the separation of the platinum from the iron, copper, and gold, is effected.

By the magnet no particles could be separated from the ore. It is probable that this had been done before it was forwarded to Europe. It is interesting here to remark on the magnetic properties of platinum. Berzelius was the first who discovered that there existed a magnetic platinum ore and a non-magnetic ore, notwithstanding that the latter contains nearly the same amount of iron combined as the magnetic ore. His analysis of the platinum ore of Nischnei-Tagilsk, separated into the magnetic and the non-magnetic parts, is generally known, so that it is not necessary to repeat it here. The platinum ore of the Ural, of Pinto in South America, contains likewise a combination or alloy of platinum and iron. The platinum ore, as it is commonly called, is a mixture of different alloys, with iron, copper, and the other platinoid metals. The natural combinations of platinum and iron remind us of the original discovery of this valuable metal, a century ago, when Buffon supposed that the white gold or platinum was not an element but a compound of gold with iron ; Bergmann, the Swedish chemist, succeeded in pointing out, in 1777, the elementary condition of the new useful metal. Platinum scales or laminæ are frequently covered with *rusty spots* from the iron, and this is removed by hydrochloric acid, as stated in the analysis. The above analysis may be taken as the average of several trials, because the commercial platinum ore is not regular in its composition. Several samples of the same ore, analyzed in quantities of two grammes, gave results as follows :—

	A.	B.	C.
Gold	4.62	0.90	1.33
Platinum	65.22	71.21	75.03
Iridium	"	9.23	3.22
Insoluble and osmiridium	9.61	8.13	10.15

Hence it follows, that Mr. Claus was right, viz., that an analysis of platinum ore should not be undertaken with less than ten grammes ($\frac{1}{3}$ ounce Troy).

For the *commercial valuation* I followed the method of Sobolewsky, as used at the Mint of St. Petersburg. The gold having been separated by boiling in diluted aqua regia, the ore is dissolved in a mixture of three parts hydrochloric acid 25° B, and one part nitric acid 40° B, in the proportion of 10 or 15 parts acid to one part of ore. The result was—

Platinum	70.21	
Gold	3.97	
Not dissolved	8.83	being osmiridium and minerals.
Iron, copper, iridium, osmium, palladium, &c.	15.38	
Iron and copper	1.61	separated previously by hydrochloric acid.
	100.00	

It is very remarkable that the platinum appears in small circular or oval laminæ like drops laminated or flattened, as if struck by a hammer ; grains with crystalline facettes could seldom be distinguished. I call this very remarkable, because the gold of the same ore exhibits the form of *pepitas en miniature* or microscopic nuggets, or irregular grains ; I saw some small globules and octahedric crystals. The platinum of South America has the same appearance.

In the residue, not dissolved in aqua regia, could be distinguished, as stated by Fremy, the *residu en grains* being the alloy of rhodium, osmium, iridium, and the *residu en paillettes* being iridium, ruthenium, rhodium, osmium. The other mineral constituents of this residue were grains or small pebbles of topaz, hyacinthe, ruby (?), diamond, quartz, and feldspar.

It is unnecessary to dwell upon the industrial uses of platinum. I will, however, say a few words upon the metals associated with it, because they hold out the promise of many future useful applications, since Deville, at Paris, has taught the method of melting them. By aid of his lamp, platinum is easily melted. At the

last Exhibition in Paris we admired the objects made from molten platinum by Savard, and since then attempts have been made to employ it as a plating for copper for cheap chemical apparatus.

The temperature sufficient for melting 300 grammes (0.3 kilogrammes) of platina, melts 90 to 50 grammes (0.04 to 0·05 kilogrammes) of rhodium.

The temperature sufficient for melting 100 to 150 grammes (0.10 to 0.15 kilogrammes), platina melts 10 grammes (0.10 kilogrammes) iridium, which was considered as perfectly infusible.

The iridium is commonly alloyed with platinum; the latter is then less attacked by chemical agents and is much harder, but can be hammered and laminated equally well. A large proportion makes the platinum more brittle.

During last year M. Chapuis, at Paris, stated that rhodium, alloyed with platinum, formed a combination that could be hammered and laminated without difficulty, and that this combination had the excellent property of not being attacked by aqua regia, and thus the earnest wishes of the practical chemist are satisfied.

The American patent of Batchelder recommends alloying iridium with copper for etching purposes. If this be confirmed by experience there will be a new field opened for a useful application of it. The use of the iridosmine for the diamond pens, and of the rhodium for the same purpose, must not be omitted. It is said that one ounce of rhodium fetches in the United States from £2 10s. to £50, according to its purity.

I hope these notices may serve to demonstrate that the platinoid metals, scarcely known to the public, even by name, are very valuable substances, requiring further investigation with a view to future useful employment. The residue of the platinum ore, a few years ago of a very low value, scarcely £4 per lb. avoirdupois, has already risen in price, and is now saleable at four or five times that amount.—*Journal of the Society of Arts.*

PROCESS FOR QUANTITATIVE ESTIMATION OF MERCURY ASSOCIATED WITH FATTY BODIES.

BY ERNEST NICKLÈS.

Several methods have been recommended in books for estimating mercury when mixed with fat, as is required to be done in examining mercurial ointment.

Some of these processes involve an inconvenient amount of manipulation; others, more expeditious, consist either in getting rid of the mercury and fat by means of heat, and then weighing the residue, which consists of foreign matter, or in simply indicating whether or not the ointment has been falsified, without attempting to determine the nature or importance of the falsification, by immersing a small piece of the ointment in sulphuric acid of 66° mixed with two parts of water.

The method which I propose presents the advantages of involving but little manipulation, while it affords the means of estimating very exactly the ingredients which are present. It is formed on the principle I have already made known in my communication on the purification of amorphous phosphorus. A mixture being formed of two substances of different densities, to separate these by means of a liquid of intermediate density, in such a way that the lighter substance may float over the liquid and be removed in any suitable manner, while the heavier substance unites at the bottom of the vessel.

This is the mode of proceeding. A given quantity of the mercurial ointment to be examined, say five grammes, is to be weighed, and introduced into a small flask with a flat bottom. Bisulphide of carbon, in sufficient quantity to dissolve the fat, is added, and the mixture agitated for some minutes to promote the solution of the fatty matter. There is now to be added a solution of chloride of calcium of specific gravity 1.38. The mixture is agitated and then allowed to stand. In about eight or ten minutes the separation of the ingredients will be complete. The bisulphide of carbon holding the fat in solution will form the upper stratum, beneath which will be the saline solution, and below this the mercury in a finely divided state. Any foreign matter that may have been present will be either mixed with the mercury or diffused through one of the upper strata. The solution of fat in sulphide of carbon is to be decanted off, and a fresh portion of sulphide of carbon added to remove any remaining portions of fat that may be adhering to the sides of the vessel or to the other ingredients, and this is again to be decanted off.

The mercury will be found at the bottom of the vessel, mixed mechanically with any foreign matters that may have been present. For estimating the quantity of the mercury I employ the method proposed by M. Barreswil for the analysis of mercurial minerals, and which consists in melting a fragment of fusible metal in water, at the bottom of which is the mercury to be estimated. The following is the mode of proceeding in this part of the process:—After the fat has been removed by means of sulphide of carbon, there will remain in the flask the saline solution and the mercury, with any foreign matter. To this is added a weighed quantity of fusible metal, and heat is applied. When the metal is fused it is slightly agitated until all the mercury has been taken up by the fused mass, and the vessel is then allowed to cool, or the cooling is promoted by the application of cold water. When this has taken place the metallic button is taken out, washed, dried, and weighed. The augmentation of weight which the fusible metal is found to have acquired, will, of course, represent the quantity of mercury.

If it is desired to determine the nature of any foreign matter present, this must be separated from the liquids by filtration.

The quantity of fusible metal to be used is not a matter of indifference. If the quantity be too small in proportion to the mercury, the alloy will not solidify on cooling. The proportion which answers well, is six or eight times the weight of the mercury supposed to be present in the ointment.

It is also desirable to dilute the solution of chloride of calcium after having decanted off the sulphide of carbon. If the solution is too dense the fused metals divide into globules and do not readily unite again, but if the solution is diluted with an equal volume of water, the union of the metals will instantly take place.

This very expeditious process is at the same time very exact; it affords the means of recovering all the mercury, especially if care be taken to use sulphide of carbon that does not contain sulphur in solution.

I have always recovered in this way very nearly the whole of the mercury which I had intimately mixed with fat, both in experimenting with those ingredients alone, and also when foreign bodies, such as powdered graphite or sulphide of antimony, had been added.

May it not be inferred, from the facility with which the amalgamation of the fusible metal takes place, under the circumstances described, that the whole of the mercury in mercurial ointment is in the metallic state? In reference to this point I have made comparative experiments, in which a certain quantity of oxide of mercury was mixed with the fat, and after removing the fat in the way already described, I have found that combination between the mercury and the fusible metal does not take place immediately; in fact, it is only after applying a boiling temperature for some hours that a certain part of the mercury enters into combination, and even then by displacing an equivalent quantity of the fusible metals, which are separated as oxides. On separating the oxides by filtration, and applying appropriate tests, the presence of bismuth, lead, and tin, as well as mercury, are easily detected. In operating on good mercurial ointment, not only does the amalgamation take place immediately, but no separation of metallic oxide occurs. This proves, I think, that the mercury in mercurial ointment is all in the metallic state.—*Journal de Pharmacie.*

[The last statement in this paper must be understood as referring to the absence of oxide of mercury in an uncombined state in mercurial ointment. There is no doubt that good mercurial ointment always does contain oxide of mercury combined with the fat.—Ed. *Pharm. Jour.*]

THERAPEUTICAL PROPERTIES OF LARCH BARK.

Association of the Fellows and Licentiates of the King and Queen's College of Physicians, Ireland, April 7th, 1858.

DR. AQUILA SMITH (V.P. COL. PHYS.) IN THE CHAIR.

Dr. Moore (M.R.I.A.) read a communication on the Therapeutical Properties of Larch Bark, recently introduced to the profession by Dr. Charles Frizell, of this city. Dr. Frizell having found a decoction of the inner bark of the "pinus larix" very efficacious in his own person, thought it worthy of minute analyzation, and accordingly placed it in the hands of Professor Aldridge, for whose skill and attention in the completion of it, Dr. Frizell feels deeply grateful. Amongst the constituents of this

bark we may mention starch, gum, resin, and tannin. Dr. George Alexander Kennedy, Physician to the Cork Street Fever Hospitals, found the extract of larch bark in doses of three grains every fourth hour, very efficacious in arresting epistaxis and intestinal hæmorrhage, in a young man aged eighteen years, labouring under typhus fever; the hæmorrhage in this case was gradually, but effectually, arrested in thirty-six hours; he also prescribed it, with much benefit, in cases of bronchitis, with profuse expectoration setting in during convalescence from fever; in such cases he gave it in three grain doses every third or fourth hour.

Dr. Hugh Carmichael, of this city (who was the first to advocate the employment of turpentine in iritis), treated a case of bronchitis, with bloody sputa, which occurred in a young lady aged thirteen years, with extract of larch bark, gr. 3, ipecacuanha, gr. ½, three times daily; this treatment had the best effect in diminishing the bronchial super-secretion, in checking the hæmoptysis, and imparting general tone to the system. A case somewhat analogous to the last was treated by Dr. Moore (Physician to the Institution for Diseases of Children) with 2½ grain doses of the extract of larch bark every fourth hour, counter irritation, with linimentum crotonis being used at the same time. This patient, a young man, aged seventeen years, had a cough of six weeks' standing, with profuse expectoration streaked with blood; in ten days he was sensibly benefited, and continued to amend steadily. The first effect of the extract in this case was to stimulate very sensibly the urinary secretions. The tincture* of the larch bark is of a dark carmine colour, has an agreeable "pinic" smell; in taste it partakes of the oleo resins, is styptic, and carminative; it is one, if not the most elegant form at our disposal, of prescribing a terebinthinate, either as an addition to a compatible expectorant or other fluid mixture, or to be given "per se." From the experience of those who have tried it, it is conclusive that the larch bark is a stimulating, slightly styptic, expectorant, with a direct tendency to the mucous membranes in general, and, in the first instance, to the genito-urinary in particular, consequently, its use is equally indicated in fluxes from the urethra or bladder. The dose of the extract is from gr. i. to v.; of the tincture, from ℥ss. to ℥iij.—*Dublin Hospital Gazette.*

ON THE EQUIVALENTS OF THE SIMPLE BODIES.

BY M. DUMAS.

The equivalents of the simple bodies, that is to say, the respective weights of the material particles, by the combination of which all bodies in nature are formed, have been determined, for the most part, by Berzelius with so much care, that they serve for all the wants of practical chemistry, even under delicate and complicated circumstances. By their aid the true formulæ of compound bodies are manifested, and they leave no doubt on the mind of him who employs them in giving symbolic expression to the crude results of analysis.

Carbon alone formed, in this respect, a decided exception. Its equivalent, estimated too high, rendered uncertain or false the formulæ of all the bodies of organic chemistry rich in carbon, of which correct analyses had been made. Its rectification was followed by a reconstruction of these formulæ, and there is nothing to indicate in the present day, in the numerous researches to which organic substances are submitted, that the elements of calculation adopted for their interpretation leave anything to be desired with regard to accuracy.

It would appear, therefore, almost unnecessary to recur to a subject already exhausted, unless it be to make known the equivalents of some newly discovered bodies, or to rectify the equivalents in a few instances where the determinations had been made with substances of doubtful purity.

I have thought, however, that it would be profitable to the interests of science to undertake a general revision of the equivalents of simple bodies. It has occupied me a long time, and it certainly will not be completed before the end of next year. It requires long hours of work and great efforts of attention, to procure the varied substances which such a research requires, to analyze them to ascertain that they are in such a state of purity as is necessary; and lastly, to submit them to the proof from which the precise determination of their equivalents is to be obtained.

* The tincture was prepared with proof spirit, one pint; larch bark, two ounces. The extract was prepared from the watery infusion.

If I have thought this revision necessary, it is because the exact numbers which represent the equivalents of simple bodies are not only useful to the manufacturer, who finds in them the rule and the criterion of the operations of his manufacture, to the chemist who employs them for translating his analyses into formulæ, to the physicist who makes them the true units of weight under which the properties of bodies become comparable; but furthermore, these numbers seem to open to the natural philosopher, by the singular relations which they reveal, new and profound horizons.

Berzelius, who made this question the object of experiments and meditations throughout his life, had arrived at a conviction that the numbers representing the equivalents of simple bodies, have no other than fortuitous relations to each other, which even disappear, most frequently, as better conducted experiments enable the investigator to ascertain more exactly the true value of each equivalent.

On the contrary, Dr. Prout, an English chemist, noticed, a long time ago, a remarkable relation which is observed between the numbers appearing so different at first sight, and showed that the equivalent of hydrogen being taken at unity, those of the other simple bodies are generally expressed by whole numbers, and even most frequently by low numbers.

Moreover, it was observed that certain equivalents, those of bodies most allied in their properties, are sometimes equal, or at least bear to each other very simple relations, such as 1 : 2.

It was also recognized, that, if we consider three bodies closely allied in their chemical behaviour, the equivalent of the intermediate body is very often represented by the exact mean of the equivalents of the two extreme elements.

Finally, having been led, in 1851, at a meeting of the British Association for the Advancement of Science, to express my opinion of the cause of these relations, to which I had often directed the attention of chemists, I showed that from the comparison of the numbers representing the equivalents of the simple elements, properly so called, we might suppose that these numbers have resulted according to laws similar to those which an attentive study discovers in the formation of the equivalents of the compound elements or radicals of organic chemistry.

Thus, two opinions prevail :—

One, which seems to have been followed by Berzelius, leads us to view the simple elements of mineral chemistry as distinct substances, independent of each other, whose molecules have nothing in common, except their fixity, their immutability, their eternity. There would thus be as many distinct matters as there are chemical elements.

The other allows us to suppose, on the contrary, that the molecules of the various chemical elements may be constituted by the condensation of one sort of matter—such as hydrogen, for example—accepting as true the remarkable relation observed by Dr. Prout, and founded on the choice of his unit.

It would lead us to admit that similar quantities of this same matter may, by different arrangements, constitute elements of the same weight, but possessed of distinct properties.

There would be no inconsistency in regarding the molecule of an element intermediate between two other elements of the same natural family, as being produced by the union of two half molecules of the extreme elements.

Finally, it would assimilate by their assumed constitution the supposed simple radicals of mineral chemistry to the compound radicals of organic chemistry, whose constitution is known; the former, however, differing from the latter by a stability infinitely greater, and such that the forces at the disposal of chemistry are insufficient for effecting their separation.

These problems, which may assuredly be ranked among the most elevated that chemistry has to propose and to resolve, are they capable of being dealt with by means of the numbers collected with so much perseverance and talent by Berzelius? I do not think they are. I have often tried, like Mr. Josiah Cooke, to compare, to combine, and to discuss them, in the hope of drawing from them, with certainty, some conclusion, and I have been able to arrive at nothing but doubt. If some of the equivalents could be classed, without corrections, in a few series as terms connected together by indisputable numerical relations, there are others, and those the best known, for which all attempts of this sort remained without result.

I could not, therefore, either regard as vain and fortuitous, relations remarkable

for their precision, their simplicity, and their frequency, nor consider as general a law which was subject to the most serious and important exceptions. It therefore remained to take the only course in accordance with the philosophy of the experimental sciences, that is to say, as I proposed at Ipswich, to resolve the general problem into special questions, sufficiently circumscribed to become susceptible of being submitted to the test of experiment, to the decisive proof of direct observation, and the impartial judgment of the balance.

The following are the results of these studies, which I now present to the Academy:—

First Question. *Are the equivalents of all simple bodies multiples of that of hydrogen by whole numbers?* Two equivalents form remarkable exceptions to Prout's rule; that of chlorine among the metalloids, and that of copper among the metals. It may happen, indeed, that for a rare substance a first approximation may have furnished a fractional equivalent, which a subsequent more careful investigation reduces to a whole number. This first attempt is often incorrect, from having been made with an impure substance, or by a method not sufficiently accurate, or on too small quantities of matter. But, as regards chlorine and copper, and especially the former of these bodies, the proofs have been so numerous, the methods so correctly chosen, and the experiments so frequently made with the express view of solving the question, that a new attempt may be considered to have been not absolutely necessary.

The equivalent of chlorine, however, must enter into many of my determinations as a means of control, and it appeared to me indispensable to verify it by the same methods as were to be applied to other bodies. Consequently I have adopted the following course for more directly comparing it with that of hydrogen.

Hydrogen being taken for unity:

Oxygen is represented by 8, as I have demonstrated by the synthesis of water;

Carbon is represented by 6, as I have demonstrated by the synthesis of carbonic acid, in an investigation made in concert with Mr. Stas;

Nitrogen is represented by 14, as I proved by the combustion of ammonia and by that of cyanogen, relying on the already determined equivalents of hydrogen and carbon.

Silver is represented by 108. The perfect experiments on the composition of nitrate of silver performed by M. Marignac leaves no doubt on this point. It is sufficient to calculate them by taking 14 as the equivalent of nitrogen and 8 as that of oxygen.

This being admitted, I endeavoured to find how much chlorine 108 of silver would require for conversion into chloride of silver. For the purpose I placed in a glass tube, drawn out at one end, pure silver in small grains, which was to be converted into chloride. I directed into the tube a current of pure and dry chlorine, and caused, by a suitable heat, the combustion of the silver in the chlorine, and the fusion of the chloride of silver formed.

In such an experiment there are, as will be seen, only three weighings to be made: first, that of the tube deprived of air; secondly, that of the tube free from air, and containing the silver; and thirdly, that of the tube free from air, and containing the chloride of silver.

By means of a stop-cock, adjusted to the tube, the tube may be emptied of air and weighed in that state. I employ as the tare a tube similar to the first, and having the same weight. The silver and chloride of silver are thus weighed *in vacuo*, and we obtain their absolute weight.

Finally, as a protection against constant causes of error, which, under the same circumstances, always exert the same influence, and give results which are not the less incorrect, because they are always the same, I have avoided making use of the same weights of silver for each of my experiments. In the first I operated on 5 grammes, in the second on 10, and in the third on 20. This plan, which I recommend to chemists in all delicate experiments, is the surest I know for detecting and rendering evident the constant causes of error which a given experiment may present. In order to be certain that a number is correct, it is not enough to find it reproduced by the same means that have previously furnished it; it must also be obtained by different means.

108 grammes of silver required for conversion into chloride 35.5 grammes of chlorine.

This number accords with the old determinations of Wenzel and Berzelius, as well as with the more recent and very perfect experiments of Pelouze, Maumene, and Marignac. The simplicity of the means employed would remove all objections to the result, if any remained after the investigations of the chemists I have named.

Prout's law is therefore not general; it does not apply to chlorine.

The experiments which I have made on copper, either by reducing the binoxide of copper, or by transforming copper into sulphide of copper, place the equivalent of copper between 31 and 32; but the results are not yet sufficiently concordant to be considered conclusive.

The sequel of this statement will show that the other simple bodies which I have had occasion to study, seem, on the contrary, to be subject, without difficulty, to Prout's law, and that these furnish equivalents which are exact multiples of that of hydrogen.

A single exception, however, is sufficient to determine the necessity of examining in each particular case whether the results obtained in the determination of an equivalent, approach most to a certain whole number, or to the preceding or succeeding numbers. It should be also ascertained whether these results do not always approach to one particular fractional number.

Prout's law not being confirmed in its absolute expression—the equivalents of the simple bodies not being all multiples of that of hydrogen by a whole number—must we conclude that the law in question is but a scientific illusion, and not a truth? Such is not my opinion. Prout ascertained, first, that the equivalents of simple bodies, compared with a certain unity, are represented by whole numbers; secondly, that this unity appeared to be hydrogen, the body whose equivalent is the lightest at present known.

The first part of Prout's law, therefore, remains true. The equivalents of the simple bodies are all multiples by a whole number of a certain unity; only, as M. Marignac, whose idea I interpret, has already remarked, this unity as regards chlorine, and perhaps copper, would be represented by an unknown body, whose equivalent would be equal in weight to half that of hydrogen.

When it is known that all the elements best studied in this respect, excepting chlorine and copper, will have equivalents represented by whole numbers, it seems natural to place the unity lower, in order to bring the exceptional bodies within the rule, and not to deny the existence of the latter when so many examples confirm it.

We will say, therefore, that the equivalents of the simple bodies are almost always multiples by whole numbers of the equivalent of hydrogen taken as unity; that, nevertheless, in the case of chlorine, at least, the unit to which it may be conveniently compared, is equal to 0.5 only of the equivalent of hydrogen.—*Comptes Rendus.* (*To be continued.*)

PROCEEDINGS ON THE SALE OF POISONS BILL.

House of Lords, Friday, June 4.

The Earl of Derby, in moving the second reading of this Bill, said, its purport and aim were to carry into effect that which had been an object with that and the other House of Parliament for a considerable time, and in reference to which their Lordships last year appointed a select committee, which went very carefully into a consideration of the whole question. The Bill was founded almost entirely on the recommendations of that committee. He had referred the measure to the Pharmaceutical Society, and also to the College of Physicians for any observations they might wish to make upon it, and where those two learned bodies had agreed he had adopted the amendments they had proposed; where they differed he had adhered to the original draught of the Bill. The first object of the Bill was to increase the difficulty of obtaining poisons for criminal purposes; and the other objects of it were to prevent, as far as possible, the occurrence of those lamentable accidents which arose partly from ignorance and partly from carelessness on the part of those persons who exercised the business of selling drugs and poisons. It provided, among other things, that poisons should not be sold except to persons of full age, who should be known to the person selling them, and whose name should be signed in a book. If the purchaser were not known to the person selling the poison, it was provided that he

should produce a certificate signed by a householder, with his name and residence, stating that he knew the person to whom the sale was to be made, and those circumstances were to be entered in a book by the party selling the poison. Those very stringent provisions were applied to a considerable number of poisonous substances enumerated in a schedule attached to the Bill. There were, no doubt, other substances equally poisonous, but at the same time the sale of which could not be subjected to all the stringent provisions contained in that first clause, without in point of fact altogether destroying certain branches of trade, and preventing the transaction of legitimate business. These were laudanum, opium, tartar-emetic, and chloroform; but it was obvious that there should be some restriction even with regard to the sale of those substances, with the view to the prevention of accidents arising from ignorance, incompetence, and carelessness. It would be recollected that there was conclusive evidence given before the committee of last year that the sale of poisons was carried on by persons who had not the slightest knowledge of the properties of those poisons, and who were utterly unfit by their education and knowledge to deal with such dangerous materials. It was proposed that, preserving to all persons at present engaged in the sale of poisons the right to continue their business, for the future no person should be permitted to sell poisons of either of the classes he had mentioned without possessing a licence, which licence would only be granted after an examination of the party by properly qualified examiners. It was intended that those examiners should be three in number,—one to be appointed by the Pharmaceutical Society, another by the College of Physicians, and the third by the Society of Apothecaries. All those persons who for the space of one year prior to the passing of the Act should have been engaged in the sale of poisons to be licensed to carry on their business for a period of five years, but the licence would not be continued or renewed at the expiration of that time unless the party submitted himself to an examination. The other question to be considered was that of carelessness on the part of the sellers, and with a view to meet that it was proposed that all persons selling poisons should be required to keep them distinct and separate from all other drugs, and that the examiners or persons appointed by them should be at liberty at all reasonable times to visit all shops where poisons were sold, in order to ascertain whether the requirements of the Bill were complied with. There were pecuniary penalties for infringement of any of these provisions, and it had been considered also lately necessary that when the poison had been improperly sold, or otherwise dealt with by any servant or shopman, the employer should be held liable and subject to the penalties attaching to the offence. With regard to arsenic there was a special provision that it should be kept mixed either with soot or indigo, except in cases where it could be shown that it was required for purposes for which such mixture would render it useless. Those were the main provisions of the Bill, and although some persons were inclined to urge more stringent regulations, yet it had been deemed most prudent to act in accordance with the views of the medical profession, and thus ensure that willing co-operation that was needed to carry the measure into beneficial operation. There were some verbal amendments which would be introduced, and he now proposed to read the Bill a second time, and to go into committee *pro formâ* on Monday next.

Earl GRANVILLE thought the Government had acted wisely in adopting the suggestions of the Pharmaceutical Society and the College of Physicians. With regard to the examiners, he was not sure that the Government ought not to appoint them, or at least one of them. The Bill, with a few amendments, would, he thought, prove a beneficial measure, and he therefore supported the second reading

Lord CAMPBELL expressed his satisfaction that there was at last a prospect of the important subject of the sale of poisons being effectually dealt with.

After a few observations from the Earl of HARDWICKE and Lord AVELAND, the Bill was read a second time.—*Times.*

June 10.

The House went into committee on this Bill, and the clauses were agreed to with some verbal Bill amendments.—*Times.*

SALE OF POISONS, &c., BILL.

As amended on Recommitment.

ARRANGEMENT OF CLAUSES.

COMMENCEMENT of Act, sect. 1. 14 and 15 Vict., c. 13, repealed as to England, 2. Definition of poison, 3. No poison mentioned in part 1 of schedule A. to be sold to a person unknown to the seller, except in presence of a witness of full age, 4. Entries to be made regarding the sale of such poisons, 5. Label required on poison sold, 6. Provision for colouring arsenic, 7. No poison to be sold without licence, except by Medical Practitioners or Pharmaceutical Chemists, 8. Appointment of examiners, 9. Applicants for licences to be examined, 10. Persons now carrying on business as Druggists to be entitled to licences without examination, such licences not to continue in force beyond five years, 11. Fees on grant of licences and on examinations, 12. Fees may be reduced by Order in Council, 13. Gift of poisons to be subject to the provisions applicable to sales, 14. Prescriptions of medical men and wholesale dealings exempted, 15. Poisons to be distinctly labelled and kept apart in the shop or dispensary. Poisonous medicines for external use to be labelled, 16. Examiners empowered to enter the shops of Druggists and places where medicines are sold by retail, 17. Penalty for offending against the Act, 18. Extent of Act, 19. Schedules.

A BILL (AS AMENDED ON RECOMMITMENT) INTITULED AN ACT TO RESTRICT AND REGULATE THE SALE OF POISONS.

Whereas the existing restrictions on the sale of arsenic have been found to be insufficient, and the unrestricted sale of other poisons facilitates the commission of crime, and occasions frequent fatal accidents : Be it enacted by the Queen's most excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows :

I. Save where herein otherwise provided, this Act shall commence and take effect from and after the thirty-first day of December, One thousand eight hundred and fifty-eight.

II. The Act of the session holden in the fourteenth and fifteenth years of Her Majesty, chapter thirteen "to regulate the sale of arsenic," shall be repealed with respect to England.

III. In the construction of this Act the word "Poison" shall mean any drug or substance mentioned or referred to in either part of the schedule (A.) to this Act, save where such construction would be repugnant to the context.

IV. No person shall sell any poison mentioned or referred to in the first part of the said schedule to any person who is unknown to the person selling the poison, unless the sale be made in the presence of a witness of full age who is known to the person selling the poison, and to whom the purchaser is known, and who signs his name, together with his place of abode, to such entries as are required by this Act, before the delivery of the poison to the purchaser ; and no person shall sell any such poison to any person other than a person of full age, unless there be produced and delivered to the seller, before such sale, a written certificate, signed by a householder, with his name and residence, stating that he knows the person for whose use the poison is required, and that he believes it may be safely supplied to him ; and all such certificates shall be carefully preserved by the seller in the order in which they are received.

V. Every person who sells any such poison shall forthwith, and before the delivery of the same, enter or cause to be entered, in a fair and regular manner, in a book or books to be kept for such purpose, in the form set forth in the schedule (B.) to this Act or to the like effect, a statement of such sale, and the following particulars :

1. The date of the sale and delivery of such poison ;
2. The name, surname, and address of the person to whom the poison is delivered;
3. The name and quantity of the poison sold ;
4. The purpose for which such poison is stated to be required ;

Into which circumstances the person selling such poison is hereby required and authorized to inquire of the purchaser, before the delivery of the poison ; and such entries shall in every case be signed by the person so making the same and

by the person to whom the poison is delivered, and (where the sale is required to be made in the presence of a witness) shall also be signed by the witness, who shall add his place of abode.

VI. No poison shall be sold either in a solid or liquid state, unless the vessel, box, wrapper, cover, or bottle, as the case may be, containing such poison, be distinctly labelled with the word "POISON" in conspicuous capital letters, and with the name, surname, and address of the person selling the poison.

VII. No person shall sell any arsenic unless the same be before the sale thereof mixed with soot or indigo, in the proportion of one ounce of soot or half an ounce of indigo at the least to one pound of the arsenic, and so in proportion for any greater or less quantity: provided always, that where such arsenic is stated by the purchaser to be required, for some purpose for which such admixture would, according to the representation of the purchaser, render it unfit, such arsenic may be sold without such admixture in a quantity of not less than ten pounds at any one time.

VIII. After the thirtieth day of June, one thousand eight hundred and fifty-nine, no person, other than a legally qualified Medical Practitioner or Pharmaceutical Chemist, shall sell any poison without a licence to vend poisons granted under this Act.

IX. For the granting of licences, and the examination of persons desirous of obtaining licences under this Act, three Examiners shall be appointed from time to time; and the College of Physicians of London, the Society of Apothecaries of London, and the Pharmaceutical Society of Great Britain shall severally appoint one of such Examiners; and every such Examiner shall hold office for such term as the body by whom he is appointed shall think fit and direct.

X. The Examiners shall sit in London or elsewhere in England, as they may from time to time think fit; and such Examiners, or any two of them, shall from time to time examine persons applying to them, for the purpose of ascertaining their proficiency in the branches of knowledge requisite to enable them safely to vend poisons; and any person who shall pass the examination to the satisfaction of the Examiners conducting the examination, or the majority of them, shall be entitled to a licence to vend poisons, which shall be signed by the Examiners by whom he may have been examined, or by any two of them.

XI. Every person, having carried on for one year or upwards before the commencement of this Act, the business of a Chemist and Druggist, or of preparing, dispensing, and vending drugs and medicines by retail, shall, upon satisfying the Examiners, or any two of them, of the fact of his having for the time aforesaid carried on such business, be entitled, without any examination, to such licence to vend poisons, but no such licence granted without examination shall be in force for more than five years after the passing of this Act.

XII. There shall be paid to such persons as the Examiners shall appoint to receive the same, upon the grant of each licence, by such Examiners (save where such licence is granted after examination), a fee of ten shillings, and for admitting any person to be examined, save where such person has previously received a licence which will cease to be in force after the expiration of five years after the passing of this Act, the like fee of ten shillings; and the monies received in respect of such fees shall be applied in the payment of such allowances to the Examiners in respect of their attendances in the grant of licences and in examinations, and of the expenses incident to the duties to be performed under this Act, as the Examiners, with the sanction of the Secretary of State, shall from time to time direct.

XIII. Provided always, that it shall be lawful for Her Majesty, with the advice of Her Privy Council, from time to time to reduce the fees payable as aforesaid to such respective amounts as to Her Majesty, with such advice as aforesaid, may seem fit; and every Order in Council reducing the said fees shall be published in the *London Gazette*.

XIV. If any poison be given or delivered by any retail dealer in drugs (whether gratuitously or in exchange for any other article or thing) to any other person, such gift or delivery shall for the purposes of this Act be deemed a sale, and all the provisions and penalties of this Act applicable to a sale of poison shall apply to such gift and delivery, and for the purposes of this Act the person giving or delivering the poison, shall be deemed the seller, and the person to whom the same is given or delivered shall be deemed the purchaser.

XV. The provisions herein-before contained shall not extend to the sale of any

medicine required to be made up or compounded according to the prescription of a legally qualified Medical Practitioner, or made up or compounded by a legally qualified Medical Practitioner or Pharmaceutical Chemist, or by a Veterinary Surgeon having a licence or diploma from the Royal College of Veterinary Surgeons, or to the sale of any patent medicine, or to the sale of poison by wholesale to retail dealers upon orders in writing in the ordinary course of wholesale dealing.

XVI. And whereas it is expedient, that as well Members of the Medical Profession and Pharmaceutical Chemists as others should be subject to regulations in respect of the keeping of poisons and the delivery of poisonous preparations intended for external use:

Every person who keeps for sale by retail any poison, and every Apothecary, Surgeon Apothecary, or other Member of the Medical Profession, or Pharmaceutical Chemist, and every officer of any hospital, infirmary, or dispensary, who has under his custody any poison, shall keep all such poisons separated from all other drugs and medicines, and distinctly labelled with their names;

All liquid medicines intended for external use, and consisting of or containing any poison, shall be sold and delivered in bottles labelled in conspicuous capital letters "POISON" or "FOR EXTERNAL USE."

XVII. The Examiners under this Act, or any two of them, or any person or persons appointed by writing under the hands of such Examiners or two of them for this purpose, shall have full power, from time to time, at reasonable times in the daytime, to enter and search any shop or place where any drugs or medicines, simple or compounded, are sold by retail, to ascertain that the provisions of this Act concerning the keeping of poisons separate from other drugs, and the labelling of the same, are duly observed.

XVIII. If any person sell any poison, save as authorized by this Act;

Or deliver the same without having made and signed the entries hereby required on such sale, or without having obtained such signatures to such entries as are required by this Act, or without complying with all the provisions of this Act in relation to the sale of such poison;

Or if any person purchasing any poison give false information to the persons selling the same in relation to the particulars which such last-mentioned person is hereby authorized to inquire into of such purchaser, or procure, by a false certificate or other false pretence, such poison, or procure by false pretences a certificate for the purchase of poison;

Or if any person sign his name as aforesaid as a witness to a sale of poison to a person unknown to the person so signing as a witness;

Or if any person sell or deliver any liquid intended for external use, and containing any poison, otherwise than in a bottle labelled as aforesaid;

Every person so offending shall for every such offence, upon a summary conviction of the same before two justices of the peace, be liable to a penalty not exceeding five pounds for the first offence, and to a penalty not exceeding twenty pounds for the second offence.

And every person so convicted of such offence more than twice shall for the third and for every subsequent offence, upon a summary conviction of the same before two justices of the peace, be liable to a penalty of not less than twenty nor more than one hundred pounds.

And if the person selling or delivering any poison, or any liquid intended for external use, and containing poison, without complying with all the provisions of this Act in relation to the sale or delivery thereof, be an apprentice or servant acting on behalf of his master, then the master, on whose behalf the sale or delivery is made, as well as such apprentice or servant, shall be liable to the penalty imposed by this Act in respect of the offence; and all such penalties shall be levied by the distress and sale of the goods and chattels of the offender.

XIX. This Act shall extend only to England.

Schedules to which this Act refers.

SCHEDULE (A.)

PART I.—Arsenic and its Compounds. Corrosive Sublimate. The poisonous Vegetable Alkaloids and their Salts. Prussic Acid. Cyanides of Potassium. Essential Oil of Bitter Almonds, unless deprived of its Prussic Acid. Cantharides. Aconite and its Preparations. Oxalic Acid. Nux Vomica. Cocculus Indicus.

PART II.—Laudanum. Opium. Chloroform. Salts of Sorrel. Tartar Emetic.

SCHEDULE (B.)

Date of Sale and Delivery.	Name and Surname of Purchaser.	Purchaser's Place of Abode and Occupation.	Name and Quantity of Poison sold.	Purpose for which required.	Name of Person giving Certificate.
Saturday, Sept. 26, 1859, 10 30 A.M.	*Henry Holmes*	27, *Snow's Fields, Bermondsey, Shoemaker.*	*Arsenic* ½ *lb. Coloured Blue with Indigo.*	*For destroying Rats and Mice.*	*James Paget, Incumbent of St. Olave's, Bermondsey.*

(*Signature of Purchaser.*)
HENRY HOLMES.

(*Signature of Witness.*)
JOHN SIMS,
26, Tooley Street,
Southwark.

(*Signature of Vendor.*)
SAMUEL EDWARDS.

LEGISLATION FOR PHARMACY IN CANADA.

THROUGH the *Montreal Medical Chronicle* for April we are informed that a Bill has been drawn up and submitted to the Members of the College of Physicians and Surgeons of Lower Canada, for the regulation of Apothecaries. The proposed Bill is divided into ten sections, some of the provisions of which are of the most arbitrary character, and should be resisted by the Pharmaceutical body of Canada as an oppressive interference with their rights and privileges; such an interference as would not be tolerated in England. In fact, the Parliamentary movement in 1840, which called forth the resistance of the London Chemists, and resulted in the formation of the Pharmaceutical Society, was not so oppressive as this proposed measure. We doubt not that the Pharmaceutical body of Canada need improvement, but let the amelioration come from their own exertions, in their own way, under the sanction of the Canadian Parliament. To this end the Canadian Apothecaries should bring forward a counter Bill, undertake to educate and regulate themselves under the direction of a provincial Society of Pharmacy, and by its means raise their status, and accomplish all the changes considered desirable by the College of Physicians.

The following is a brief view of the Bill:

1st. Provides, very properly, that every person who shall practise Pharmacy shall be twenty-one years of age, and shall have served a regular apprenticeship of three years to the business. It also requires that he shall have a diploma from the College of Physicians, certifying to his examination by its Board of Governors.

2nd. Every such practitioner shall have had a sound elementary education, be of good moral character, shall have attended a course of lectures on medical jurisprudence, and two courses on materia medica and chemistry, each of six months' duration, at some recognized *medical* college.

3rd. Enacts that every person practising pharmacy for gain, without a diploma, shall be fined five pounds for the first offence, ten pounds for the second, and twenty pounds for the third offence, and, on conviction by court, imprisonment in gaol.

4th. This clause enacts, that the Board of Governors of the College shall regulate the fees to be paid by all candidates for licence to practise as Apothecaries, Chemists, and Druggists, provided the amount of such fees shall not exceed fifteen dollars, &c.

5th. Requires every licensed Apothecary to have his diploma registered by the Registrar of the College of Physicians and Surgeons.

6th. Enacts that every Apothecary who vends an adulterated or spurious medicine, shall be fined five pounds for the first, and ten pounds for the third offence, &c.

7th. This clause is in reference to the sale of poisons, requiring each sale to be preceded by a certificate from a physician, clergyman, or justice of the peace, addressed to the vendor, to be kept in evidence; and for not so complying, the Apothecary to be finable two pounds currency for each offence.

8th. Provides for the keeping of arsenic, strychnia, corrosive sublimate, &c., in "a private and safe place," and in yellow bottles, legibly labelled; and inattention to it to be met by a penalty of five pounds.

9th. Gives the Board of Governors the power to appoint a committee of three of their number to visit the shop of any Apothecary, between the hours of ten o'clock A.M. and three o'clock P.M., to see if the above requirements are attended to, and each refusal to admit such visitors shall incur a penalty of five pounds on conviction.

10th. Refers to the manner of collecting fines.—*American Jour. of Phar.*, May, 1858.

THE DEPARTMENT OF SCIENCE AND ART.

The fifth report of the "Science and Art" Department has been published in a Blue-book of 160 pages. The duties of the department consist of a general superintendence over several distinct institutions for the promotion of science, the aiding of schools, and the direction of a training school for art-masters, and a museum and library at South Kensington. The usual notice is taken of each of the metropolitan institutions. The Museum of Practical Geology was visited last year by 17,197 persons. That useful institution, "the Government School of Mines," in Jermyn Street, appears to be in a flourishing and progressive state. Last year there were 11 matriculated and "perpetual" students, and 66 occasionals. The course of study includes physics, metallurgy, chemistry, natural history, geology, and applied mechanics. The lectures to operatives in natural history (Professor Huxley), geology (Professor Ramsay), and applied mechanics (Professor Willis), have been the same as in 1854; they are eagerly sought after. The students attending the chemical laboratory under Dr. Hofmann have increased to 116. Two young gentlemen who passed through the *curriculum* at Jermyn Street with credit have been appointed "exploring geologists" in surveys undertaken by the Government. One of them, Mr. Bauermann, proceeds to the Rocky Mountains of America; the other, a Mr. Thornton, accompanies Dr. Livingstone to South Africa. The South Kensington Museum now comprises nine separate collections (organized by Mr. Cole), including a circulating art library, and the famous Sheepshanks gallery of pictures. The buildings of the Museum, except the Sheepshanks gallery, are reported to be of a temporary, and even insecure nature. The iron structure erected by the Exhibition Commission has proved a woeful failure; it is not watertight, the temperature is very unequal, and the risks from fire in the interior are serious. The repairs of the structure are constant and costly, and that "something must be done" is obvious. The Museum at Kensington is a wonderful favourite of the public, considering its remote and far from central situation. 40,000 persons attend monthly, whereas at Marlborough House, in the last year before the removal, the average monthly attendance was only 7,800. Up to the 12th of May last 430,997 persons visited the Museum, which was opened on the 22nd of June, 1857. It is the "attraction" and not the "site" that regulates the number of visitors, and the number who have visited the models of patented inventions at South Kensington has by 30 to 1 exceeded the number of visitors to the annual exhibition of the Society of Arts in the Adelphi—a central situation. The evening visitors exceed the diurnal in the ratio of 5 to 1, and the working classes abound, appearing highly delighted both with the Museum itself and the exhibitions. It is explained that in allowing certain persons, including Mr. Ruskin, the author, to give illustrative lectures, the department is not responsible for their opinions. On the whole, the public manifest a worthy and laudable desire to use the facilities offered by the State for the study of science and art. The various museums of the three capitals have been visited by 553,853 persons, and the removal of the department from Marlborough House to South Kensington has proved signally successful.—*Times*, June 14th.

POISONING BY TURPENTINE VAPOUR.

M. Marchal (de Calvi) communicates the following fact:—Mademoiselle H. of good constitution and sanguineo-nervous temperament, was convalescent from an attack of acute articular rheumatism, when she had the windows and doors of her sleeping apartment painted with oil-colour, composed of ceruse, oil of pinks, and oil of turpentine. The room was large and airy, having two doors and two windows; and finding herself somewhat fatigued on the day upon which it had been painted, she retired early to bed; she had not, however, been asleep more than two or three hours, when she awoke in a state of alarming uneasiness, but having sufficient strength to cry out. M. Favrot, who had attended her in her recent illness, was sent for. On his arrival, he found the patient in the following conditions:—The countenance anxious, shrunk, and pale; the eyes sunk, and surrounded by a dark ring; the voice gone, and the strength so completely exhausted, that the limbs upon being raised fell heavily back by their own weight; acute pain in all the joints; violent and continuous abdominal pain, causing the patient to lie doubled up; nausea, yet inability to vomit owing to excessive weakness; respiration hurried, short, and anxious; pulse threadlike, and scarcely perceptible; a cold and clammy perspiration existed over the whole body. The symptoms resembled those of malignant cholera, and M. Favrot asserted that he would have set them down as such, had it not been for the powerful odour of turpentine in the room,—an odour so strong that he suffered

from headache until next day. Without any delay Mademoiselle H. was conveyed to an adjoining house, and there had brandy and hot camomile exhibited to her, along with a stimulating draught of tincture of canella. Sinapisms in great number were applied, and other remedies resorted to, but in spite of every endeavour the patient remained for thirty-six hours in a condition of utter prostration; and eight days passed before she regained sufficient strength to stand. She is now, however, restored to perfect health.—*Revue de Therap. Med. Chir.—Edinburgh Med. Journal.*

MELANCHOLY DEATH OF MR. HENRY MATTHEW WITT.

Much painful excitement was created on Saturday, the 19th of June, by the discovery at the Museum of Practical Geology, in Jermyn Street, that one of the young chemists who had for some time acted as Lecture-Assistant in that establishment, had put an end to his life by taking poison. The deceased, Mr. Henry Matthew Witt, was educated as a Pharmaceutical Chemist. He was apprenticed to one of the founders and active members of the Pharmaceutical Society, Mr. W. Bartlett, of Chelsea, by whom every facility was afforded him for indulging the fondness he manifested for scientific study. He became a student in the School of the Pharmaceutical Society, where he soon distinguished himself as a young man of considerable talent, combined with great industry and powers of application. Having determined to relinquish the profession of pharmacy and devote himself to scientific chemistry, he entered the Royal College of Chemistry, and was soon afterwards appointed assistant to Dr. Hofmann. While still filling this office he was appointed by the Government, in conjunction with Dr. Hofmann, and no doubt on the recommendation of the latter, to investigate the state of the Thames and the influence of the sewage of London upon it. We believe also that he rendered valuable assistance to Dr. Hofmann in preparing the new editions of Fownes's Manual of Chemistry. Latterly he had entered into an engagement to assist Mr. Watts in producing a new edition of Dr. Ure's *Dictionary of Chemistry*, for the accomplishment of which undertaking he resigned his appointment in Jermyn Street. Mr. Witt was now fully, in fact too actively, engaged in scientific work. Naturally of an excitable temperament, the very success which had attended his studies and labours, the prospects of future advancement which dawned in the horizon, and the responsibilities of his present occupations, so shook the nervous system that he suddenly became desponding, mistrustful of himself, and incapable of pursuing his work. He relinquished all he was engaged in, applied for his former appointment in Jermyn Street, and even contemplated a return to his previous occupation of pharmacy. But each step now only aggravated the malady which instigated the first movement in this direction, until, on the morning of the day above named, he was found by one of the porters of the institution in the last agony, resulting from a dose of nicotine. At an inquest on the body, a verdict was returned of death under the influence of temporary insanity. Dr. Hofmann, in explaining to the jury that nicotine was a poisonous alkaloid derived from tobacco, stated that he had obtained two grains of this alkaloid from 100 grains of snuff, and that about a grain would destroy the life of an adult. This is the first case of poisoning with nicotine that has occurred in this country. The deceased was universally respected by those who knew him, and his loss is felt alike on the score of friendship and in the interests of science.

ACTION FOR THE RECOVERY OF DEBT FOR MEDICINES SUPPLIED BY A CHEMIST.

COOPER *v.* WARD.

A correspondent has sent the following, taken from a Wolverhampton paper:—

This was an action brought by Mr. Cooper, chemist and druggist, of Horsley Fields, against Mr. Ward, solicitor, of this town, the claim being for £3 5*s.* for certain medicines supplied to the defendant's son, who is a minor. The case came before Mr. Serjeant Clarke on the 16th of April, when the plaintiff was nonsuited, with leave to move to enter a verdict for the amount claimed. That motion was made before Mr. C. Winston at the County Court, on the 10th of May, when Mr. Winston reserved his judgment until he had conferred with Mr. Serjeant Clarke, before whom the case had been previously heard. Mr. Winston has submitted his judgment on the case, which is as follows:—"In this case the judge, Mr. Serjeant Clarke, reports that it was proved at the trial that the defendant took his son to the plaintiff, informed the plaintiff of the nature of his malady, and desired him to give him medicine proper for his case. That the plaintiff thereupon attended the defendant's son at different times at the plaintiff's house, and gave him certain

medicines (the value of which he now seeks to recover), according as he considered the same applicable to the case, and as it would appear rightly, since it was not contended that there was any want of skill in the application of the medicines, or indeed that the defendant's son was not cured. The judge considered that upon the evidence the transaction could not be regarded in the light of a sale of goods by a chemist over the counter, inasmuch as the defendant left it to the judgment of the plaintiff as a medical man to give from time to time such drugs as were proper for the complaint; and thereupon he nonsuited the plaintiff under the Apothecaries Act, 55 Geo. III., c. 194. Upon these facts, with every disposition to assist the plaintiff, I am compelled to say that the nonsuit was right. The 17th section enacts that it shall not be lawful for any one (not then already in practice) to practise as an apothecary unless duly certificated, subject to the penalty imposed by the 20th section. And the 21st section enacts that no apothecary—that is, no person acting as an apothecary, shall be allowed to recover any charges claimed by him in a court of law, unless certificated, or unless he was then already in practice. And the question is whether the plaintiff, in supplying these goods, did 'practise as an apothecary,' it being admitted that if he did there is no cause of action. According to the definition given in 'Apothecaries' Company *v.* Greenhough,' 1 Q.B., 805, 'Allison *v.* Haydon,' 9 Bingham, 621, and as acted upon in other cases, an apothecary is a person who, if certificated, may both prescribe, sell, and administer and supply drugs; and according to 'Morgan *v.* Hallin,' 8 A. and E., 489, charge both for attendance and drugs, or make such an increased charge for drugs as would include a reasonable remuneration for attendance. But it was contended that here the plaintiff, who only claimed the value of the drugs at the same price as if they had been sold over the counter, without charging anything for medical skill, in prescribing them might recover such value under the 28th section as a chemist and druggist. But it appears to me that if this view were acted on it would practically repeal the statute. Any chemist and druggist might then prescribe for and attend patients gratis, and charge only for the goods supplied, at the ordinary rate, and so in a certain degree remunerate himself for his medical skill indirectly out of the profits from a druggist's business increased by such adventitious means. But it is this very giving of advice and regulating the taking of medicines supplied, the particular exercise of the functions of an apothecary by an uncertificated person, that it was the object of the statute, with a view to the protection of the public, to prevent; as plainly appears from the preamble to the 7th section. Goods so supplied cannot, I think, be regarded as goods sold by a chemist and druggist in the ordinary way of business; but rather goods supplied as auxiliary to treatment and advice prescribed and given by a chemist and druggist acting as a medical man. He who supplies goods under such circumstances does not the less act as an apothecary because he chooses to make a lower charge than a regularly certificated apothecary probably would do for his drugs, which charge, as we have seen, is one of the modes in which an apothecary is paid. The value of such drugs, however estimated, is the charge he claims for actually, though not avowedly, acting as an apothecary. But this the 21st section prevents his recovering. This view of the statute is, I think, in conformity with 'Richmond *v.* Coles,' 1 Dowling (N.S.), 560, where the Court, in an action on a chemist's bill, consisting of attendance and drugs separately charged for, held that the proper question for the jury was, whether the plaintiff as to the whole transaction acted (or, more correctly, practised) as an apothecary. It may be a question whether, considering the high attainments of chemists and druggists now as compared with their pretensions forty-three years ago, they might not with advantage to the public be emancipated from the disabilities of the Apothecaries Act.* But this is one proper for the Legislature. I can only deal with the law as I find it, according to which I am of opinion that the rule for setting aside the verdict in this case must be discharged."

REVIEW.

ELEMENTS OF CHEMISTRY; *including the Applications of the Science in the Arts.* By THOMAS GRAHAM, F.R.S., late Professor of Chemistry in University College, London; assisted by HENRY WATTS, B.A., F.C.S. Second Edition, revised and enlarged. Vol. 2.

THE concluding part of this work, which has so long been looked for, has recently

* Chemists do not profess to undertake the medical treatment of patients, and it would not be to their advantage to become "Apothecaries."—ED.

appeared, and Graham's *Chemistry* may still be appealed to as a standard work of reference, although in its present form it comprises only Inorganic Chemistry. In preparing the second volume, now under notice, the author has availed himself of the assistance of Mr. Watts, who is well known as the editor of Gmelin's *Handbook of Chemistry* for the Cavendish Society. The metals and their compounds are treated of in this volume, in addition to which there is a copious Supplement, in which the subjects treated in the first volume are resumed, and brought down to the present time ; and much new matter is introduced on heat, light, electricity, chemical notation and classification, relations between chemical composition and the density and boiling points of bodies, chemical affinity, diffusion of liquids, osmose, development of heat by chemical combination, &c. &c. There is, in fact, in this part of the book, as well as elsewhere, an amount and a description of matter, such as give to it the character of a new work, in which the indefatigable industry, well grounded scientific knowledge, and literary qualifications of the editor of Gmelin's *Handbook of Chemistry* have been directed by the sound and mature judgment of the late Professor of University College. Under the head of Chemical Notation and Classification, will be found a concise yet explicit description of the views and theories of the modern French school, with which the names of Gerhardt and Laurent are so prominently associated. These views having been already adopted by several chemists in this country, they are likely to form subjects of discussion for some years to come ; and as they materially affect the system of notation and the nomenclature in general use, it becomes essential for those who are engaged in chemical pursuits, and especially for those who have occasion to refer to recent memoirs on chemical subjects, to acquire a knowledge of the new language in which chemical facts are now frequently expressed. In this language the atomic weight of hydrogen being 1, that of oxygen is 16, instead of 8 as heretofore ; and in common with oxygen, the atomic weights of carbon, sulphur, selenium, and tellurium are doubled, while the atoms of the other elements remain unchanged. According to this system, the symbolic representation of water is H_2O, protoxide of iron is Fe_2O, and peroxide of iron Fe_4O_3 ; while protochloride of iron is FeCl, and perohloride, Fe_2Cl_3. This system of notation, however, is not adopted in the work before us, excepting in the chapter referred to, where Gerhardt's system and theories are explained.

TO CORRESPONDENTS.

J. B. (Liverpool).—Tartarized iron should be entirely soluble in water ; it is sometimes imperfectly prepared, a portion of the sesquioxide of iron not being in chemical combination with the bitartrate of potash.

J. G. J. (Barnsley).—See page 1.

M. P. S. (Musselburgh) is thanked for his enclosure.

A Registered Apprentice.—Yes.

H. (Altrincham).—The proportions mentioned are those generally used—there is no chloric ether of the Pharmacopœia.

A Dispenser (West Hartlepool).—*Artificial Ice.*—See page 30.

D: S. M.—For platinizing the silver plates of a galvanic battery, the following instructions are given by Mr. Smee :—" Each piece of metal is to be placed in water, to which a little dilute sulphuric acid and nitro-muriate of platinum are to be added. A simple current is then to be formed by zinc placed in a porous tube with dilute acid; when, after the lapse of a short time, the metal will be coated with a fine black powder of metallic platinum."—(2.) Gum Acaroides is a name that has been given to New Holland Gum, or Resin of Xanthorrhœa.

X. Y. Z.—The flocculent deposit in quinine wine is, we believe, caused by astringent matter in the orange wine, which precipitates some of the quinine.

The Sale of Poisons Bill.—A general answer to the inquiries of correspondents on this subject will be found at the commencement of this number. The further progress of the Bill is postponed until Monday, the 5th July. Every effort is being made to ensure the removal or modification of the objectionable provisions; the result will be communicated to the Members at the earliest opportunity.

Instructions from Members and Associates, respecting the transmission of the Journal, to the Secretary, 17, Bloomsbury Square.

Advertisements (not later than the 23rd) to Mr. CHURCHILL, New Burlington Street. Other communications to the Editor, 15, Langham Place.

LIST

OF THE

MEMBERS, ASSOCIATES, AND APPRENTICES

OF

The Pharmaceutical Society of Great Britain.

1858.

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Bucklee, William Henry.....86, New Bond Street
Davenport, John Thistlewood...33, Great Russell Street, Bloomsbury
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Morson Thomas, N. R. .....38, Queen's Square, Bloomsbury
Peacock, Hamerton R. .....170, High Street, Poplar
Sandford, George Webb .....47, Piccadilly
Squire, Peter .....277, Oxford Street
Standring, Thomas.....1, Piccadilly, Manchester
Waugh, George .....177, Regent Street

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Elias Bremridge, 17, Bloomsbury Square.

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	Mialhe, Agrégé Libre de la Faculté de Médecine Pharmacien de l'Empereur
	Pelouze, Membre de l'Académie des Sciences
	Soubeiran, Membre de l'Académie de Médecine, Professeur à la Faculté
	Weddell, Docteur en Médecine, Membre de la Société Philomatique
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Stockholm	N. P. Hamberg, M.D.
St. Domingo	Sir Robert H. Schomburgk

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Year of Member-ship.	No. of Certificate.	NAME.	RESIDENCE.
1851		Alexander, James Lyon	Sydney
1858	486	Avice, Ernest Charles	Mauritius
1848	34	Baeër, Gustave E.	Strasbourg
1855	401	Baissac, Pierre Joseph	Mauritius
1852	167	Baschet, George Constant	Mauritius
1858	505	Baschet, Pierre Edmond	Mauritius
1849		Baylis, William	Launceston, Tasmania
1852		Bishop, William	Wellington, N. Zealand
1858	506	Boullé, Janvier Alfred	Mauritius
1852		Carpenter, Henry	Demerara
1854	347	Dru, Casimir Theodore A.	Mauritius
1850	74	Fleurot, Emile	Mauritius
1855	389	Francis, Henry	Melbourne
1853		Guiot, Jean Felix E.	Mauritius
1850	82	Lamusse, Louis A.	Mauritius
1847		Lediard, Charles	St. Vincent
1847	28	Mailloux, Joseph	Mauritius
1851	93	Mailloux, Auguste	Mauritius
1858	508	Minet, Alphonse Edouard	Mauritius
1847	19	Nobrega, Gerardo Jose da	Madeira
1855	407	Noël, Ferdinand	Mauritius
1852	118	Regnaud, Charles	Mauritius
1850		Roberts, Henry	Florence
1852		Roberts, Thomas H.	Gibraltar
1843		Rogers, Henry	Bombay
1852	72	Sinimberghi, Nicholas	Rome
1858	467	Skinner, Henry	Kingston, Canada West
1844	1	Sparks, John	Bombay
1844		Stewart, F. H.	Demerara
1857	468	de Valancé, Charles P.	Mauritius
1853		Whitburn, Augustus R.	Rome

The figures in the second column correspond with the number of the Certificate of Examination.

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Year of Membership.	No. of Certificate.	NAME.	ADDRESS.
1850	70	Allchin, Alfred ..	Cole's Terrace, Islington
1843		Allen, George	7, Cowper Street, City Road
1841		Allen, William	2, Morgan's Place
1853		Ambrose, John	1, Union Place, Commercial Road
1844		*Ambrose, Thomas	94, Whitechapel Road
1842		Anderson, Charles	23, Lower Belgrave Street
1857	241	Andrews, Frederick	8, Store Street
1842		Appleton, Thomas Cass	45, Curzon Street
1841		Ashton, William	154, Sloane Street
1853		Attwood, Alfred	61, Cannon Street
1841		Austin, Henry	161, Bermondsey Street
1853		Bailey, Delamore J.	18, Conduit Street
1841		Baiss, William A.	102, Leadenhall Street
1841		Baiss, James	102, Leadenhall Street
1841		Baker, William J.	21, Brecknock Place, Camden Town
1845		Ball, Thomas M.	77, St. George's Road, Southwark
1841		Balmer, John	94, St. John Street Road
1841		Barber, Thomas A.	2, Scott's Place, Islington
1842		Barber, Joseph	7, Orange Street
1856		Barkley, William	18, Little Tower Street
1848		Barnard, John	1, Oxford Terrace, Clapham Road
1853		Barnes, James B.	1, Trevor Street, Knightsbridge
1853		Barron, Frederick	2, Bush Lane
1841		Barry, John T.	Plough Court
1841		Bartlett, William	1, Brettin Terrace, Chelsea
1844		Bastick, William	2, Brook Street
1841		Bayley, Edmund	26, Leadenhall Street
1851		Beaton, John	174, Shoreditch
1853		Becket, William E.	6, Giltspur Street
1841		Bell, Jacob	338, Oxford Street
1853	17	*Bell, William Henderson	48, Albany Street, Regent's Park
1842		Bentley, William	11, Mount Street, Bethnal Green
1841		Best, John D.	26, Suffolk Street, Pall Mall
1841		Bigg, Thomas	Great Dover Street
1855	270	Biggs, Walter	19, Notting Hill Terrace
1842		Binge, Thomas	Stockbridge Terrace, Pimlico
1842		Binnington, Stephen	35, Haymarket
1841		Bird, William L.	42, Castle Street East
1850	57	Bird, Augustus	22, High Street, Kensington
1843		Blake, Charles T.	47, Piccadilly
1842		Bland, John	57, Penton Street, Pentonville
1841		Blandford, John F.	9, Bruton Street
1853		Bolton, William	146, Holborn Bars
1842		Bond, Henry	11, Cross Street, Hoxton New Town
1853		Boothby, Henry Neal	72, Crawford Street
1842		Boully, Peter	Queen's Road, Bayswater
1849		Bourdas, Isaiah	10, Pont Street, Belgrave Square
1842		Bowden, Edward	13, Charles Street, St. James's
1852		Bower, William	96, Tottenham Court Road
1842		Bradley, John	21, Belgrave Road, Westminster
1847		Brewer, Eli	43, Duke Street, Manchester Square
1857	450	*Brewer, John W. N. T.	5, Liverpool Street, City

* Life Members.

Year of Membership.	No. of Certificate.	NAME.	ADDRESS.
1853	190	Bromley, Richard Martin	Denmark Hill
1845		Brooks, Charles	Southville, Wandsworth Road
1853		Brotherton, William H.	1, Clyde Terrace, Caledonian Road
1842		Brown, James	27, Aldgate
1842		Buck, Thomas	Kingsland Green
1842		Buckle, Christopher P.	3, North Place, Gray's Inn Road
1846		*Bucklee, William H.	86, New Bond Street
1845		*Burden, Edward	38, Duke Street, Grosvenor Square
1846		Burden, Thomas	6, Store Street, Bedford Square
1841		Burfield, Henry	180, Strand
1853		Burgoyne, James	31, Throgmorton Street
1857	333	*Butt, Edward Northway	235, Oxford Street
1855		Carr, John	171, High Holborn
1853		Carrick, James	46, Churton Street, Pimlico
1853		Carty, John	172, New Bond Street
1853		Cattell, George	Homerton
1853		Chard, Frederick J.	13, Eccleston Street South
1853		Chubb, James C.	59, St. John Street, Clerkenwell
1845		Clarke, Benjamin	Mare Street, Hackney
1856	181	Clarkson, James	109, High Street, Islington
1841		Cobb, Robert C.	10, Frederick Place, Hampstead Road
1853		*Cockrill, James	2, Wellington Street, Waterloo Town
1849		Cocksedge, Henry B.	20, Bucklersbury
1852		Colchester, William M.	2, Crown Street, Hoxton
1849		Cole, William H.	52, Gracechurch Street
1842		Coles, John	New Road, Camberwell
1854	191	Coles, Charles	72, Euston Square
1845		Collins, John R.	Haverstock Hill
1853		Collins, Robert N.	Oxford Court, Cannon Street
1841		Compton, Charles	14, Brewer Street, Golden Square
1841		Constance, William	5, Hanover Place, Regent's Park
1848		Constance, Edward	37, Leadenhall Street
1853		Cooke, John	171, Hoxton Old Town
1848		Cooper, William T.	26, Oxford Street
1853		Cooper, Robert H.	20, Royal Exchange
1847		Corfield, Daniel	22, Thrawl Street, Spitalfields
1853		Cornelius, Joseph	Clapham
1848		Cowdery, George T.	36, Paternoster Row
1845		Cracknell, Charles	107, Edgware Road
1858		Crocker, Edwin	19, Richmond Road, Islington
1853		Cross, Henry	4, Shepperton's Pl., New North Rd.
1841		Croucher, John T.	223, High Street, Shadwell
1853		Croyden, Charles	37, Wigmore Street
1842		Cullen, William	37, Beckford Row, Walworth
1852		Curtis, Frederick	15, Crawford Street
1842		Dakin, Joseph	248, High Street, Poplar
1853		Darby, Stephen	140, Leadenhall Street
1842		Davenport, John T.	33, Great Russell Street, Bloomsbury
1841		Davies, Charles	11, Claremont Place, North Brixton
1845		Davies, Henry E.	43, Wood Street, City
1853		Davis, David	47, Gerrard Street
1841		*Davy, Charles	100, Upper Thames Street
1841		Deane, Henry	Clapham
1850		Dickinson, William	16, Cambridge Street, Edgware Road
1842		Doughty, Edward William.	4, William Street, Knightsbridge

Year of Membership.	No. of Certificate.	NAME.	ADDRESS.
1841		Down, John	1, Queen's Road, Bayswater
1841		Drew, James	2, Bush Lane, Cannon Street
1845		Eade, George	39, Goswell Road
1847		Eardley, John	14, Charles St., Westbourne Terrace
1841		Eddy, Charles W	30, Crown Street, Finsbury
1853		Edwards, William S	14, Eltham Place, Old Kent Road
1853		Elam, Benjamin	196, Oxford Street
1853		Elkington, Edward	56, Grange Road, Bermondsey
1849		Ellis, George H.	4, Pavement, Finsbury
1853		Elvey, Thomas	8, Halkin Street, West
1841		Evans, John	60, Bartholomew Close
1851		Evans, John H.	60, Bartholomew Close
1841		Farmar, Robert A.	40, Westminster Road
1841		Faulconer, Robert H	Keen's Row, Walworth
1853		Fells, John	Stockwell
1853		Fenn, John T.	83, Regent Street, Westminster
1841		Field, William	27, Queen's Buildings, Brompton
1856	88	*Field, James John	18, Chichester Street, Paddington
1842		Fincham, Robert	57, Baker Street
1847		Fincham, Zacariah C.	57, Baker Street
1854	195	Fisher, William Henry	36, Ely Place, Holborn
1858	160	Forrest, Richard	9, Celbridge Place, Westbourne Park
1842		Foulger, Samuel	133, St. George's Street, East
1841		Fowler, Richard	14, Brewer Street, Golden Square
1841		Fox, William	48, Church Street, Bethnal Green
1856		Francis, George B	2, High Street, Islington
1857		Francis, George	5, Park Lane
1841		Freeman, John	13, Blackfriars Road
1853		Freeman, Richard	5, Clayton Place, Kennington Road
1843		*Freeman, Robert	38, High Street, Kensington
1853		Gadd, Charles	1, New Bridge Street, Vauxhall
1842		Gale, Henry	3, Millbrook Street, Camden Town
1854	78	Gale, Samuel	338, Oxford Street
1841		Galliers, George	230, Tottenham Court Road
1841		Garden, Alexander	372, Oxford Street
1843		Garden, Felix R.	372, Oxford Street
1841		Garle, John	12, Kensington Terrace
1858		Gedge, William Stedman	77, St. John Street
1850		*Gerard, Philip Augustus	390, Strand
1848		Gigner, John	King's Road, Chelsea
1843		Gill, George W	15, Crown Place, Walworth
1842		Glover, George	19, Goodge Street
1841		*Gloyne, Charles	5, Terrace, Kensington
1842		Goddard, John D	6, Arthur Street, City
1853		Golding, William	42, Upper Albany Street
1842		Goodbarne, Thomas	13, Charles Place, Charles Square
1842		Goodbarne, Thomas R	Hornsey Road
1853		Goode, Thomas	47, Minories
1847		Goodger, David	30, Regent Street
1853		Goosey, William	5, Ocean Row, Stepney
1853		Gorton, John G.	144, High Street, Whitechapel
1854		Gosden, Henry	140, Leadenhall Street
1856		Gould, John	Chicksand Street
1853		Gould, John Granger	198, Oxford Street

Year of Membership.	No. of Certificate.	NAME.	ADDRESS.
1853		Green, Josiah James	6, Henry St., Avenue Rd., St. John's
1847		Greenish, Thomas	20, New St., Dorset Sq. [Wood
1851		Greenwell, Baker	St. John's Wood
1842		Griffiths, John	Clerkenwell Green
1841		Grindle, George	122, Pall Mall
1853		Grisdale, John M.	216, Tottenham Court Road
1853		Gristock, Thomas	42, South Street, Manchester Square
1851		Gulliver, William	33, Lower Belgrave Street
1841		Gunton, Walter G. B.	6, New Weston Street, Southwark
1856	197	Guy, George H.	63, Great Russell Street, Bloomsbury
1853		Hackman, Leonard L.	41, Union Street, Bishopsgate Street
1853		Haine, John	Allen Road, Stoke Newington
1853		Hall, John Heaton	309, High Holborn
1857		Hall, Robert	18, Wigmore Street
1841		Hanbury, Cornelius	Plough Court, Lombard Street
1841		*Hanbury, Daniel Bell	Plough Court, Lombard Street
1857		*Hanbury, Daniel	Plough Court, Lombard Street
1846		Harding, John T.	4, Cheapside
1852		Harvey, Edward	6, Giltspur Street
1855		Haselden, Adolphus F.	18, Conduit Street
1843		Hemingway, Walter	20, Portman Street
1842		Henly, John C.	213, Upper Thames Street
1853		Henty, Henry M.	87, High Street, St. John's Wood
1841		Herring, Thomas	40. Aldersgate Street
1841		Herring, William	40, Aldersgate Street
1841		Herring, Edward	Trinity Square, Southwark
1843		Hewitt, John	1, Wellclose Street, Wellclose Square
1842		Hewlett, Charles J.	Cree Church Lane
1852		Hickley, Thomas P.	125, Edgware Road
1853		Hilgenberg, Henry	38, Houndsditch
1842		Hill, Arthur S.	11, Little Britain
1853		Hill, Arthur B.	11, Little Britain
1848		Hills, Thomas H.	338, Oxford Street
1852		Hockin, John B.	38, Duke Street, Manchester Square
1848		Hodgkinson, Henry	3, Newland Terrace, Kensington
1852		Hogg, Robert	9, Albion Place, Hyde Park Square
1841		Hooper, William	24, Great Russell St., Covent Garden
1842		Hooper, William	7, Pall Mall East
1841		Hooper, Bartlett	43, King William Street, City
1841		Hooper, Hugh H.	22, Commerce Place, Brixton
1853		Hopkin, William K.	5, New Cavendish Street
1849		Hopkins, Thomas	34, Montague Square
1851		Hopkins, Thomas B.	Tulse Hill, Brixton
1853		Hora, Henry W.	58, Minories
1853	175	Horncastle, John	12, Stanhope Terrace
1841		Horner, Edward	20, Bucklersbury
1841		Horner, James T.	20, Bucklersbury
1856	412	Howell, Maurice	Peckham
1856	435	Howell, Thomas	61, North Place, Gray's Inn Road
1842		Hucklebridge, James M.	103, Upper Ebury Street
1841		Hudson, William B.	27, Haymarket
1843		Hughes, William P.	170, Hoxton Old Town
1853		Hugill, John	61, Cannon Street
1842		Humpage, Benjamin	44, Chancery Lane

Year of Membership.	No. of Certificate.	NAME.	ADDRESS.
1842		Hunt, Henry	1, St. George's Terrace, Gibson Sq.
1853	198	Hunt, William	Camberwell Green
1842		Huskisson, John	12, Swinton Street
1841		*Huskisson, William	12, Swinton Street
1853		Huskisson, Henry O.	77, Swinton Street
1848		Huxtable, John	104, St. John Street Road
1848		Huxtable, William	104, St. John Street Road
1853		Ingram, Robert	2, Queen's Terrace, St. John's Wood
1841		Jackson, John	47, Southampton Row
1853		Jamieson, John	49, Davies Street, Berkley Square
1855	298	Jefferson, Ebenezer W.	3, Southgate Road, De Beauvoir Town
1845		Jeynes, George W.	42, Princess Street, Edgware Road
1851		Jeynes, Edward	49, Great James Street, Lisson Grove
1853		Jobson, Thomas C.	4, John's Row, St. Luke's
1853		Jolley, George	13, Curzon Street, Mayfair
1842		Jones, Peter	11, Norton Folgate
1849		Jones, Henry S.	Fulham Road
1841		Keating, Thomas	79, St. Paul's Churchyard
1842		Kemp, Robert	2, Queen's Place, Holloway
1842		Kemp, Richard	Upper Street, Islington
1841		Kent, Thomas	226, Blackfriars Road
1848		*Kernot, George	2, Chrisp Street, Poplar
1852	81	Kershaw, George	113, Park Street
1853		Kettle, Joseph	42, Castle Street East
1853		King, Robert	21, Princes Street, Hanover Square
1853		King, Charles T.	86, Snow Hill
1855	309	Kingdon, William Y.	6, Devonshire Terrace, Notting Hill
1853		Lacy, Benjamin W.	13, Westbourne Grove
1842		*Langton, Frederick C. R.	226, Upper Thames Street
1850		Large, John H.	2, Holt's Place, New North Road
1853		Laugher, Charles H.	Camden Town
1853		Lavers, Richard H.	28, Old Street Road
1856		Lawrence, Frederick	8, New Chapel Street, Kentish Town
1857	429	Lawrence, Henry	49, High Street, Kensington
1853		Leach, John	2, New Cavendish Street
1841		Lescher, Joseph S.	60, Bartholomew Close
1842		Lessey, John	97, High Street, Marylebone
1853		Lidwell, Joshua A.	46, High Street, Notting Hill
1853	260	Long, George	114, High Holborn
1853		Lovell, Frederick G.	10, Staverton Row, Walworth
1853		Lowe, William E.	8, Stafford Street, Bond Street
1841		*Luckombe, Charles	86, Snow Hill
1841		*Macmurdo, Edward	100, Upper Thames Street
1842		McCullock, William	95, Bishopsgate Street
1849		McCullock, Charles	Covent Garden.
1853		McDougall, William	174, Regent Street
1849		Maitland, Alexander	8, Torrington Place, Torrington Sq.
1841		Maitland, John	10, Chester Place, Hyde Park
1853		Mansell, William	Plough Court
1853		Marris, Joseph	37, Berners Street
1853		Marshall Thomas	2, Clayland's Place, Clapham Road
1853		Mason, John W.	45, Upper Marylebone Street
1853		Matland, George	10, Nassau Place, Commercial Road
1842		May, John	Battersea
1857		*Medlock, Henry	20, Great Marlborough Street

Year of Membership.	No. of Certificate.	NAME.	ADDRESS.
1842		Meggeson, George	61, Cannon Street
1853		Merrell, James	1, Queen's Terrace, Camden Villas
1855		Mitchell, John	12, Well's Row, Islington
1842		Moody, James	24, Church Street, Camberwell
1846		Moore, James L.	1, Craven Street, Westbourne Terrace
1853		Morson, Thomas	19, Southampton Row
1841		*Morson, Thomas N. R.	Queen Square, Bloomsbury
1841		Moscrop, Edward H.	164a, Strand
1855		Mould, Samuel	21, Moorgate Street
1855	218	Mumford, George	5, Bathurst Street, Hyde Park
1853		Nicholls, John	1, Union Place, New Kent Road
1853		Northway, John	27, Great Tower Street
1842		Oakley, George W.	35, Lamb Street, Spitalfields
1853		Ogle, William H.	Battersea
1855		Oldfield, Henry	3, Radcliff Terrace, Goswell Road
1841		Orridge, Benjamin B.	30, Bucklersbury
1853		Palmer, Robert	33, Wilton Place, Belgrave Square
1853		*Parnell, George William	3, Artichoke Place, Mile End Road
1842		Pasmore, James	5, Colville Terrace, Pimlico
1853		Pattison, George	126, St. John Street Road
1853		Peacock, Hamerton R.	170, High Street, Poplar
1841		Pedler, George S.	199, Fleet Street
1852		*Penrose, Arthur Wellesley	7, Amwell Street, Clerkenwell
1853		Pepper, John	1, Bedford Street, Bedford Square
1843		Peppin, Sydenham H.	25, Princes Street, Leicester Square
1854		Phillips, John	3, Vernon Place, Bagnigge Wells Rd.
1842		Philpot, Henry	32, Praed Street, Paddington
1843		Plummer, George	High Street, Peckham
1841		Pollock, Thomas	129, Fenchurch Street
1841		Portello, William	91, Charlwood Street, South Belgravia
1842		Potts, Robert U.	55, South Audley Street
1853		Power, John Henry	Denmark Hill
1846		Pratt, Edmund	2a, Bloomsbury Square
1842		Preston, Joseph T.	94, Smithfield Bars
1852		Preston, Stanton W.	94, Smithfield Bars
1855	68	Quiller, Charles R.	15, Sloane Square
1841		Rawle, William	97, Fleet Street
1841		Rea, Edward	115, Wardour Street
1853		Readman, Henry	18, Mortimer Street, Cavendish Sq.
1841		Redwood, Theophilus	19, Montague Street, Russell Square
1856		Reynolds, James John	15, Hanover Street
1854		Richards, James	40, New Bridge Street, Blackfriars
1845		Richardson, George	12, Norland Place, Notting Hill
1848		Ridsdale, James	1, Wakefield Terrace, Caledonian Rd.
1843		Roach, Pope	8, St. James's Street
1841		Rouse, Benjamin R. C.	9, Wellington Street, Southwark
1842		Rouse, Frederick J.	Clapham
1841		Rouse, Robert	1, Wigmore Street
1841		Rowland, Christopher	260, Tottenham Court Road
1857	328	Rowntree, Thomas	2, Arundel Place, Islington
1848		Sadler, William	13, Norton Folgate
1841		Sainsbury, Samuel	177, Strand
1843		Sandford, George W.	47, Piccadilly
1853		Saxeby, William S.	11, Tothill Street, Westminster

Year of Membership.	No. of Certificate.	NAME.	ADDRESS.
1853		Schacht, William	38, Houndsditch
1843		*Sharpe, George Young	6, Kensington Terrace
1842		Sharwood, James Allan	98, Fenchurch Street
1841		*Shirley, John George	1, Westbourne Grove, Bayswater
1852		Simmons, Joseph	38, Lambeth Walk
1851	89	Sims, John F.	8, Hemingford Place, Barnsbury
1854		Skidmore, John	3, Charles St. West, Westbourne Ter.
1842		Slipper, James	86, Leather Lane
1847		Smith, William F.	12, Keen's Row, Walworth
1854		Snell, Glanville A.	3, Hampton Terrace, Hampstead Rd.
1843		Solly, Stephen F.	St. George's Circus, Southwark
1842		Southwood, Thomas S.	Harrow Road
1841		*Squire, Peter	277, Oxford Street
1841		Squire, William	95, Bishopsgate Street
1841		Starkie, James	4, Strand
1858	147	Stathers, John	49, Norland Place, Notting Hill
1849		Stead, John M.	213, Upper Thames Street
1842		Steer, Philip R.	Clapton
1854	97	Stocken, James	112, Drummond Street, Euston Sq.
1850		Stuart, John E.	172, New Bond Street
1853		Summers, James R.	43, Curtain Road
1841		Swire, Roger	14, Edgware Road
1854		Swire, George	Brixton Hill
1854		Taylor, John	77, Hackney Road
1853		Thomas, Henry	7, Upper St. Martin's Lane
1851		Thomas, Richard W.	10, Pall Mall
1855		Thomas, John Jabez	Stoke Newington
1845		Thompson, Henry A.	86, Chiswell Street
1857	372	Tibbs, Frederick	47, Blackfriars Road
1841		Tippett, Benjamin M.	3, Sloane Street
1841		Tonge, George	213, Upper Thames Street
1842		Towerzey, Alfred	20, Marylebone Street
1857	61	Trask, Thomas	14, Albany Street
1853		Tupholme, John T.	38, Lamb's Conduit Street
1853		Turner, Richard	2, Oxendon Street, Haymarket
1853		Tustin, Thomas H.	London Hospital
1842		Twinberrow, William	2, Edward Street, Portman Square
1852	90	Urwick, William W.	35, Denbigh Street, Pimlico
1853		Vint, James	185, Bishopsgate Street
1857	357	*Vizer, Edwin B.	63, Lupus Street, Pimlico
1841		*Wagstaff, John Henry	James Street, Westbourne Terrace
1842		Walker, Alexander	10, Ireland Row, Mile End
1842		*Walker, Henry	35, Skinner Street, Somers Town
1844		Waller, Arthur	6, Middleton Square
1845		Ward, Francis	14, Grosvenor Street
1846		*Warner, Charles Heath	55, Fore Street
1844		Watts, William	3, Gray's Place, Brompton
1853		Watts, William M.	32, Whitecross Street
1853		Watts, Peter	11, Sol's Row, Hampstead Road
1856	110	Watts, Henry T.	11, Victoria Road, Pimlico
1841		Waugh, George	177, Regent Street
1853		Wegg, William	10, North Place, Ball's Pond
1842		Westwood, William H.	16, Newgate Street

Year of Membership.	No. of Certificate.	NAME.	ADDRESS.
1842		Westwood, Robert	16, Newgate Street
1854	321	Wheeler, Christopher	56, Hackney Road
1841		White, John	228, Piccadilly
1841		White, Daniel	19, Terrace, Regent's Park
1852		White, Edmund	19, Terrace, Regent's Park
1848		Wickham, William	34, Tavistock Place, Tavistock Sq.
1853		Wilbe, Salmon	1, College Place, Chelsea
1842		Wilkes, George	1, Hayfield Place, Mile End
1853		Wilkinson, William	114, Lambeth Walk
1851		Williams, John	5, New Cavendish Street
1857	363	Williams, Thomas	54, Piccadilly
1844		Willmott, William	83, High Street, Southwark
1857		Willows, John	101, High Holborn
1853		Wilson, Thomas	Upper Holloway
1853		Windle, William	48, Portman Place
1842		Wooldridge, John	19, Bath Place, New Road
1855	364	*Wrangham, John	3, Acre Lane, Brixton
1853		Wright, William V.	11, Old Fish Street
1853		Wright, John	60, George Street, Portman Square
1842		Wyman, John	122, Fore Street
1858	294	Yarde, Giles	28, Lamb's Conduit Street
1842		Yates, Benjamin	25, Budge Row, Cannon Street
1852		Young, Frederick	137, Minories
1853		Young, George	12, Ebenezer Terrace, Mill Wall

COUNTRY MEMBERS.

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1846		Abbott, John Thomas	Darlington
1853		Abraham, John	Liverpool
1852		Ackerman, Theophilus	Bristol
1845		Ackrill, George	Abergavenny
1847		Acton, George	Worcester
1853		Adams, John	Loughborough
1853		Adams, Jonathan Henry	Stoke-on-Trent
1853		Adkins, Henry James	Birmingham
1849		Ainslie, William	Edinburgh
1852		Aitken, William	Edinburgh
1849		Albright, Henry	Waterford
1853		Alderton, John	Hastings
1853		Aldridge, Alexander John	Brighton
1852		Alexander, James	Greenock
1848		Allanson, Charles	Harrogate
1847		Allen, Thompson	Boston
1853		Allen, Adam U.	Lymington
1853		Allis, Francis	Teignmouth
1853		Alpass, Horace S.	Liverpool
1846		Althorp, James	Stamford
1842		Amoore, Charles	Hastings
1858	400	Amos, Daniel	Canterbury
1852		Anderson, James	Musselburgh
1853		Anderson, Charles Thomas	Jersey
1841		Anderson, Duncan S.	Edinburgh
1853		Andrew, William	Aberdeen
1841		Andrews, John Betts	Clare
1853		Andrews, Thomas William Cox	Norwich
1854	375	*Anness, Samuel Richard	Ipswich
1841		Anthony, Jacob	Bedford
1853		Appleby, William H.	Stockport
1853		Archer, Thomas	Southam
1841		Argles, Henry	Maidstone
1858	268	Argles, John	Maidstone
1841		Armstrong, Henry	Preston
1853		Arnold, Adolphus	Guernsey
1841		Arnold, Edward	Norwich
1842		Arthy, Joseph	Peterborough
1853		Ascough, Jesse	Wolverhampton
1853		Ash, James Freer	Wiveliscombe
1853		Ashton, John Swan	Leicester
1853		Ashton, William	Southport
1853		Aslin, John	Sunderland
1846		Asling, Brelsford	Spalding
1855		Astley, John	Coventry
1846		Atkins, Francis Thomas	Woolwich
1842		Atkins, Francis Thomas	Deptford
1853		Atkins, Samuel Ralph	Salisbury
1853		Atkinson, Richard Marshall	Leeds
1842		*Atkinson, Stephen	Doncaster
1855	420	*Atkinson, Matthew	Manchester

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1842		Attwood, George	Brompton
1850		Aubin, James	Jersey
1853		Backhouse, William	Leeds
1844		Badcock, John	Barnard Castle
1852		Baildon, William	Edinburgh
1841		Baildon, Henry C.	Edinburgh
1853		Bailey, Richard	Penrith
1841		Bailey, William	Wolverhampton
1858	431	Bailey, Richard	Winchester
1845		Baines, Richard	Blackburn
1857	242	Baines, Wm. H.	Brompton
1841		Baker, William	Chelmsford
1850		Baker, Charles Patrick	Chelmsford
1852		Baker, William	Brentford
1842		Baker, William	Retford
1851		Baker, Philip B.	Rochdale
1855	391	*Balkwill, Frederick Pryor	Plymouth
1844		Ball, George Vincent	Banbury
1841		Ball, Joseph	Liverpool
1842		Ballard, William	Abingdon
1842		Ballard, Edwin	Farringdon
1850		Balls, George	Deptford
1845		Bally, Edward F.	Baldock
1841		Baly, Henry	Warwick
1848	12	Bancroft, John James	Ruthin
1841		Banks, Morris	Birmingham
1853		Barber, George	Liverpool
1845		Barclay, John	Falmouth
1842		Barker, William Henry	Biggleswade
1853		Barker, Joseph	Sudbury
1846		Barling, Thomas	Weymouth
1842		Barlow, John	Manchester
1841		Barnes, James	Preston
1850		Barnett, William	Brighton
1853		Barnish, Edwin H.	Wigan
1853		Barritt, George	Croydon
1849		Barron, William	Cheltenham
1842		Barry, George	Northampton
1853		Barry, Edwin	Northampton
1853		Barry, James	Northampton
1853		Barstow, Charles H.	Spofforth
1842		Barton, Robert Doidge	Brighton
1847		Barton, Henry	Brighton
1853		Barton, Charles	Brighton
1852		Barton, William	Campbeltown
1842		Bass, William Thomas	Enfield
1846		Bassett, Charles	Pontypridd
1853		Batchelor, Charles	Fareham
1853		Bateman, John Bird	Manchester
1852		Bates, John	Bicester
1853		Bath, Richard C.	Morice Town
1842		Battle, John Richard	Lincoln
1841		Baumborough, William	Wandsworth

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1855	207	Baxter, William Walmisley	Bromley
1841		Baynes, James	Hull
1841		Beach, Thomas	Bridport
1847		Beadon, John	Taunton
1852		Beard, James	Manchester
1853		Beaumont, William H.	Gravesend
1847		Beckett, John	Scarborough
1846		Beech, Joseph	Atherstone
1841		Beesley, Henry	Banbury
1844		Beesley, Thomas	Banbury
1841		Bell, William D.	Leeds
1853		Bell, Thomas	Leeds
1851		Bell, William	Carlisle
1853		Bell, Edward C.	Dudley
1857		Bell, James	Manchester
1857	280	Bell, Francis	Bradford
1841		Bennet, William	Bath
1842		Bennett, George	Newark
1850		Bennett, John W.	Leigh, Lancashire
1853		Bentham, Thomas	Southsea
1857	177	Bentley, Walter	Brighton
1847		Berry, Edward	Brighton
1853		Berry, Henry James	Worthing
1853		Bettison, Joseph	Chesterfield
1854	365	Betts, George William	Spalding
1853		Betts, John	Woodbridge
1847		Bevan, Charles F.	Harwich
1853		Bew, Robert	Bilston
1842		Biggs, Robert	Bath
1852		Bingley, Thomas Gyles	Manchester
1853		Binns, Samuel	Sheffield
1848		Binsley, James	Edinburgh
1842		Birch, Thomas Edwards	Mold
1850		Bird, Ash Rudd	Ipswich
1842		Bird, Alfred	Birmingham
1842		Bird, Charles	Worcester
1841		Bishop, Robert	Eye
1849		Bishop, Thomas	Woolwich
1853		Black, James	Leven
1852		Blacklock, Henry	Bournemouth
1841		Blacklock, Joseph D.	Brighton
1842		Blackburn, Bailey	Bradford
1842		Blades, Christopher	Leek
1846		Blades, Holland	Nantwich
1842		Blades, Sheriff	Northwich
1845		Blackshaw, Thomas	Burslem
1856		Blake, William F.	Stroud
1853		Blamires, Samuel	Bradford
1852		Blanchard, George	Edinburgh
1853		Blanchard, Thomas	Edinburgh
1857		Bland, John Handel	Stourbridge
1848		Bloor, Joseph	Derby
1853		Blunt, Thomas	Shrewsbury
1842		Boast, Thomas	York

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1842		Bolton, Thomas	Tenterden
1853		Bomford, Esau	Witney
1853		Bond, Laurence V.	Tiverton
1842		Bond, John	Great Yarmouth
1850		Bond, Charles	Leamington
1842		Bond, John	Minehead
1848		Boocock, John	Leeds
1852	116	Boorne, Charles	Bristol
1853		Booth, James	Blackburn
1842		Booth, John	Heckmondwicke
1853		Booth, Thomas Buckley	Eccles
1841		Booth, James	Rochdale
1853		Booth, Aaron	Manchester
1853		Bostock, William	Ashton-under-Lyne
1855	304	Botham, William	Manchester
1842		Bottle, Alexander	Dover
1849		Bowen, Henry F.	Rottingdean
1843		Bowers, Thomas	Chester
1847		Bowers, James D.	Chester
1841		Bowerbank, Joseph	Cockermouth
1853		Bowerbank, Fawcett	Cockermouth
1853		Bowker, James	Manchester
1853		Bowles, Charles A.	Chester
1853	257	*Boyce, John Pierce	Windsor
1841		Boyce, John Pierce	Chertsey
1856	411	*Brady, Henry B.	Newcastle-on-Tyne
1853		Bragg, William B.	Market Harborough
1842		Brailey, Charles B.	Heavitree
1849		Bramwell, George	Liverpool
1853		Brandreth, John	Preston
1853		Brandreth, Lawrence	Preston
1842		Brayshay, William Bolam	Stockton
1842		Breary, William A.	Douglas
1846		Bremner, William	Thurso
1845		Brend, Thomas	Swansea
1852		Brereton, John	Manchester
1858	272	Breton, Walter	Brighton
1842		Brew, Thomas Archer	Brighton
1842		Brewster, William	Cambridge
1853		Brierley Richard	Stalybridge
1842		Briggs, James	Tipton
1853		Briggs, George	Goole
1843		Bright, Philip	Brecon
1853		Bright, William	Bath
1850		Brimelow, Thomas	Farnworth
1853		Bromfield, William	Crewe
1853		Bromfield, Charles	Exeter
1848		Bromley, Charles	Liverpool
1853		Brothers, William	Folkestone
1846		Brown, William	Dunfermline
1852	121	Brown, David R.	Edinburgh
1850		Brown, Thomas	Lutterworth
1842		Brown, Charles	Belper
1845		Brown, William Scott	Manchester

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1853		Brown, Thomas Dudley	Coventry
1853		Brown, Samuel	Spilsby
1853		Brown, Thomas	Tyldesley
1853		Brown, Thomson	Glasgow
1853		Brown, George	Selby
1844		Brown, John	Eccles
1853		Brown, Alfred James	Halstead
1847		Bryant, William	Huntingdon
1853	226	Bryce, James	Dunfermline
1853		Buck, Richard C.	Dudley
1853		Bullus, William	West Bromwich
1853		Bunn, Charles	Leiston
1842		Burdon, John	Durham
1848		Burdwood, James	Plymouth
1851		Burgess, William	Northwich
1846		Burne, Robert Thomas	Houghton-le-Spring
1853		Burnett, Robert	Frazerburgh
1853		Burns, James Adam	Stirling
1853		Burrell, George	Montrose
1852		Burrow, Walter B.	Great Malvern
1853		Burrow, John Severn	Great Malvern
1853		Bustin, William	Shotley Bridge
1852		Butcher, Thomas	Cheltenham
1841		Butler, Samuel	Bristol
1841		Butler, William	Wycombe
1853		Butler, Thomas E.	Leicester
1856	379	Butler, John S.	Liverpool
1841		Butterfield, James Morse	York
1853		Butterworth	Ashton-under-Lyne
1849		Bwye, George	Cheshunt
1853		Caddick, John	Newcastle-under-Lyne
1849		Calvert, Robert	Stokesley
1842		Calvert, James	Belper
1846		Campbell, Donald	Glasgow
1853		Campbell, Edward D.	Sunderland
1852	122	Carmichael, Lauchlan	Edinburgh
1842		Carr, William	Leicester
1841		Carr, William Graham	Berwick
1844		*Carran, Thomas	Peel, Isle of Man
1853		Carruthers, Richard Birrell	Dumfries
1844		Cartwright, William	Newcastle-under-Lyne
1850		Carter, William	Manchester
1842		Chantry, George	Goole
1855	62	Chaplin, John Lambert	Colchester
1846		Chaplin, Alfred	Brighton
1853		Chapman, Henry	Ipswich
1853		Chapman, William	Ipswich
1853		Chapman, Henry	Clifton
1849		Chapman, Richard J.	Chipping Ongar
1841		Chapman, John Cook	Congleton
1853		Chapman, John	Tring
1853		Chapman, William	York
1853		Chapman, William Fox	Hull

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1842		Chapman, Edward	Hull
1851		Chaston, Robert	Lowestoft
1841		Chater, Jonathan	Watford
1853		Chaundy, Thomas G.	Oxford
1842		Chave, John Anstey	Uxbridge
1856	178	Chenery, William H.	Ipswich
1851		Cheshire, John	Grantham
1853		Childs, James L.	Southsea
1842		Chipperfield, Robert	Southampton
1851		Christian, Francis	Birmingham
1842		Christopher, William	Crickhowell
1853		Churchill, John	Birmingham
1856		Churchouse, William B.	Chard
1855	244	Clark, William W.	Dorking
1853		Clark, William	Longsight
1853	334	Clark, Robert	Devizes
1847		Clarke, William	Durham
1845		Clarke, John Webster	Leicester
1841		Clarke, Joseph	York
1853		Clarke, Benjamin Joseph	Cheltenham
1846		Clarke, Thomas Meadows	Richmond
1856		Clarke, Thomas	Somerton
1853		Clater, Francis	Retford
1841		Clay, Robert	Liverpool
1854	201	Clayton, John Oates	Leeds
1853		Clennell, John Morton	Newcastle-on-Tyne
1849		Clift, Edward	Lewisham
1845		*Coates, William	Leeds
1858		Coates, John M.	Newcastle
1853	123	Cobb, John S.	Yarmouth
1852		Cochrane, Thomas	Falkirk
1853		Cock, John	Shipdham
1842		Cocking, George	Ludlow
1853		Cockton, John	Maryport
1841		Colbeck, George Royde	Leamington
1845		Cole, Edward Charles	Calne
1848		Cole, Walter Thomas	Weymouth
1853		Cole, John	Whittlesea
1841		Coleman, James	Cardiff
1853		Collier, William	Sheffield
1846		Collier, William	York
1849		Collings, William Henry	Bristol
1852		Colton, Thomas	Selby
1853	185	Connacher, David	Mackinch
1853		Constable, Edwin	Birkenhead
1842		Conway, William	Pontypool
1847		Cooling, John	Newark
1850		Cooper, George Brown	Brightlingsea
1852		Cooper, James Robert	Birmingham
1841		Cooper, Thomas	Leicester
1845		Cooper, Mark Ward	Bridlington
1841		Cooper, George	Exeter
1841		Cooper, James Newbury	Clifton
1845		Cooper, Thomas	York

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1853		Cooper, Lewis	Reading
1842		Corbyn, Joseph B.	Beccles
1853		Corfield, Thomas J. T.	St. Day
1843		Cornelius Richard Bussell	Teignmouth
1845		Cornish, Henry Roberts	Penzance
1843		Cornish, William	Brighton
1841		Corrie, Charles	Bedford
1841		Cortis, Charles	Worthing
1853		Cottee, William	Salford
1853		Cotterell, William Henry	Dover
1841		Cotton, Gilbert Knill	Barnstaple
1853		Coupland, Henry	Liverpool
1853		Coupland, Joseph	Harrogate
1842		Cousins, Thomas George	Oxford
1842		Coverley, John	Scarborough
1845		Cowell, Silas	Canterbury
1845		Cowgill, Brian Y.	Burnley
1841		Crafton, Ralph Caldwell	Croydon
1853		Crarer, John	Blairgourie
1842		Craske, Samuel	Holt
1853		Crick, George Edward	Maldon
1853		Cripps, John	Hammersmith
1842		Critchley, John	Blackburn
1842		Crocker, Henry Radcliffe	Brighton
1853		Crofts, Holmes Cheney	Chatham
1852	124	Croley, William	Edinburgh
1842		Cronshey, James	Thetford
1841		Crook, George	Farnham
1841		Cropper, James	Long Sutton
1847		Cross, William Gower	Shrewsbury
1853		Croskell, Charles	York
1853		Crowder, Charles H.	Hull
1853		Crowe, Henry Joseph	Tredegar
1846		Crowther, Thomas	Tickhill
1851		Cuff, Robert C.	Bristol
1852		Cumbers, John	Wandsworth
1853		Cumine, Frederick H.	Southport
1841		Cupiss, Francis	Diss
1853		Currie, John	Glasgow
1854	273	Cuthbert, John Mason	Bedford
1842		Cutting, James Bray	Leamington
1848		Cutting, Thomas	Selby
1853		Cutts, Thomas	Basford
1842		Dale, George	Chichester
1844		Dale, William James	Portsea
1855		Dance, William D.	Stourport
1853		Dandie, David	Perth
1855	126	Dandie, Robert	Perth
1850		Davenport, Edward	St. Alban's
1846		Davidson, John	Berwick
1853		Davidson, Charles	Aberdeen
1853		Davies, Thomas	Cheltenham
1853		Davies, John L.	Hay

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1853		Davies, Peter Hughes	March
1853		Davies, William Henry	Pillgwinlly
1842		Davies, Richard Morgan	Carmarthen
1841		Davis, John	Dorchester
1841		Davis, Robert	Dorchester
1845		Davis, John Oliver	Folkestone
1848		Davis, John Oliver, jun.	St. Leonard's
1841		Davis, D. Francis	Leominster
1841		Davis, Henry	Leamington
1842		Davis, Francis	Newbury
1845		Davison, Ralph	York
1842		Davy, Henry	Wiveliscombe
1854		Dawe, Sampson	Monmouth
1853		Dawson, Thomas	Preston
1853		Day, George	Blackheath
1852		Deacon, George F.	Beccles
1853		Dearlove, Thomas D.	Brackley
1845		Death, John William	Brompton
1853		De Carle, Joseph Parkinson	Modbury
1853	194	Deck, Arthur	Cambridge
1845		Dennison, Matthew	Dudley
1853		Densham, John B.	Plymouth
1852		Dewar, Peter S.	Dingwall
1842		Dexter, James	Eastbourne
1842		Dickerson, Henry	Devonport
1845		Dickins, Rowland	Aylesbury
1847		Dingley, Richard Loxley	Evesham
1853		Dixon, Benjamin	Norwich
1854	381	*Dixon, William	Southampton
1842		Dobinson, William	Sunderland
1853		Dobson, James	Keswick
1847		Dodman, Robert	Thorney
1842		Dodshon, Edward	Sunderland
1852		Done, John	Manchester
1850		Dores, James	Alnwick
1846		Doubell, James	Rayleigh
1855		Doughty, Richard	Bushey
1842		Dowell, William Cuming	Bristol
1845		Dowman, George	Southampton
1847		Down, Richard Haydon	Torpoint
1853		Downes, Joseph	Greenhithe
1847		Downing, Joseph	Braintree
1852		Dowthwaite, William	Barnet
1841		Drage, William F.	Birmingham
1841		Dresser, Richard	York
1853		Drew, John	Pershore
1842		Dron, William	Kirkcaldy
1841		Duck, Daniel	Guisborough
1846		Dudden, Richard M.	Midsomer Norton
1852		*Dudgeon, George	Nottingham
1842		Duggan, Henry	Hereford
1853	184	Duncan, William	Rothesay
1841		Duncan, John	Edinburgh
1842		Duncan, Frederick MacRae	Sandwich

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1842		Dunhill, William	Doncaster
1853		Duprey, Jean A. B.	Jersey
1853		Durant, Frederick	Dorking
1853		Durant, Edmund	Dorking
1847		Dutton, John	Birkenhead
1842		Dutton, George	Bolton
1853		Dyer, John	Margate
1842		Dyer, Thomas	Exeter
1853		Dyer, William	Halifax
1842		Dyson, John	Andover
1853		Eastes, Thomas Henley	Dover
1853		Edgar, James	Henley-on-Thames
1853		Edmonds, Benjamin M.	Lowestoft
1853		Edmonson, John	Preston
1853		Edwards, James	Leicester
1848	22	*Edwards, John Baker	Liverpool
1853		Edwards, William	Sidmouth
1850		Edwards, Henry	Lincoln
1842		Edwards, George	Dartford
1853		Edwards, William	Denbigh
1853		Ekins, William	Huntingdon
1842		Ellaby, John	Melton Mowbray
1842		Ellis, Benjamin	Shepton Mallett
1853		Ellis, William	Abergele
1849		Ellis, Richard	Thornbury
1841		Ellison, John	Liverpool
1845		Elsey, John	Horncastle
1856	258	Elsey, Charles	Market Rasen
1847		Ely, George	Bingham
1843		*England, William Paul	Huddersfield
1848		Ereaut, John	Jersey
1853		Ereaut, George	Jersey
1851	43	Evans, Thomas	Liverpool
1842		Evans, Edward	Liverpool
1854	47	Evans, Henry S.	Liverpool
1842		Evans, John	Hemel Hempstead
1853		Evans, Samuel	Caerphilly
1853		Evans, William Luke	Cardiff
1853		Evans, John	Narberth
1847		Evans, Thomas	Aberdare
1853		Evans, William Downing	Newport, Monmouth
1858	211	Evans, Evan	Aberavon
1842		Eyre, Alfred B.	Ipswich
1842		Eyre, Thomas S.	Launceston
1844		Fairbank, James Hack	Woolwich
1853	361	Fairbarn, George	Liverpool
1853		Fairley, Thomas	Sunderland
1841		Fairweather, John	Newcastle
1853		Falkner, Richard	Banbury
1853		Farie, Gilbert	Bridge of Allan
1842		Farmer, John	Putney
1847	26	Farmer, James	Castle Donington
1853		Farnworth, William	Blackburn

Year of Membership.	No. of Certificate.	NAME	RESIDENCE.
1853		Farrage, Robert	Rothbury
1850		Farrant, Henry	Ottery St. Mary
1842		Farrant, Robert	Salisbury
1843		Farrant, John G.	Brentford
1854	99	Farrer, John Daniel	Chester
1853		Farrow, William	Woburn
1842		Fergusson, John	Liverpool
1842		Fielder, Thomas	Warminster
1842		Finch, John	Cheltenham
1846		Finemore, William F.	Plymouth
1852		Finlayson, Thomas	Leith
1851		Fisher, John Thornhill	Torquay
1853		*Fisher, Henry Christopher	Torquay
1853		Fiske, Charles	Ipswich
1843		Fitch, Robert	Norwich
1842		Fitt, Edward	Barking
1841		Fleeming, William	Wolverhampton
1842		Fletcher, Francis	Cheltenham
1841		Flockhart, William	Edinburgh
1853		Flower, Thomas S.	Matlock-Bath
1842		Foggitt, Thomas Jackson	Thirsk
1841		Forbes, William	Reigate
1853		*Forge, Christopher	Bridlington
1853		Forman, George	Birmingham
1853		Forrest, Richard William	Gainsborough
1853		Forster, John	Whitehaven
1853		Forster, John	Sunderland
1845		Forster, Robert	Dover
1853		Forsyth, William	Aberdeen
1841		Foster, Frederick	Brighton
1853		Foster, Alfred Hood	Birmingham
1841		Foster, Joseph	Collumpton
1845		Foster, James Fawcett	Hull
1842		Foster, Edward	Ludlow
1853		Foster, John	Uckfield
1855		Foster, George Pitt	Tetbury
1842		Foulds, William	Chowbent
1846		Fowke, George	Stafford
1853		Fowler, Edward	Bedale
1853		Fowler, Henry	Torrington
1849		Fox, Charles James	Witney
1853		Foxcroft, Elijah	Skipton
1842		Francis, George	Great Baddow
1853		Franks, Alfred	Ramsgate
1853		Fraser, Charles	Largs
1853		Frazer, Daniel	Glasgow
1853		Freeland, John	Barrhead
1844		Freestone, Thomas Morris	Bristol
1841		French, Gabriel	Chatham
1849	3	French, Joseph B.	Williamstown, Victoria
1853		Fresson, Lewis Francis	Stevenage
1851		Frost, William Henry	Collumpton
1841		Fryer, Henry	Huddersfield

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1851		Funnell, William Henry	Brighton
1849		Furmston, Samuel C.	Dartford
1853		Gall, Benjamin D.	Woodbridge
1842		*Gamble, Richard	Grantham
1841		Garbutt, Cornelius	Gateshead
1853		Garbutt, Cornelius D.	Gateshead
1842		Gardener, Charles	Tunbridge Wells
1841		Gardner, James	Edinburgh
1853		Garland, William	Leeds
1846		Garlick, Thomas H.	Halifax
1853		Garlick, John	Hollinwood
1853		Garnett, Joseph	Newcastle-on-Tyne
1851		Garnham, Barrington	Brighton
1842		Garratt, John Colpman	Rugby
1856		Garratt, Samuel	Rugby
1842		Garside, Burdett F.	Southport
1842		Gay, George	Stroud
1853		Geake, John	St. Columb
1846		Geldard, John	St. Austell
1842		Geldard, Richard Kelly	Plymouth
1853		Gerrard, Joseph	Longton
1841		Gibbons, William	Plymouth
1852		Gibbs, William	Ryde
1853		Gibson, Robert	Manchester
1851		Gilbert, George	Portsea
1847		Gilpin, Benjamin	Newcastle-on-Tyne
1847	37	*Giles, Richard William	Clifton
1841		Giles, Richard Bobbet	Clifton
1842		Gill, Samuel	Pendleton
1853		Gillman, Thomas Rice	Newport, Monmouth
1841		Gilkes, William	Leominster
1856	433	Gissing, Thomas W.	Wakefield
1844		Glaisby, John	York
1841		Glaisyer, Thomas	Brighton
1852	71	Glanfield, George	Torquay
1853		Glasier, Samuel	Manchester
1853		Glew, William	Selby
1850		Glover, Samuel	Liverpool
1841		Gloyne, Thomas Hadfield	Dewsbury
1858		Glyde, John William	Blandford
1845		Glynn, William	Torquay
1848		Goadsby, Thomas	Manchester
1845		Goddard, Henry Edward	Great Yarmouth
1842		Goddard, Joseph	Leicester
1842		Goodall, Thomas	Ensham
1841		Goodall, John	Newcastle-on-Tyne
1850		Goodall, Henry	Derby
1841		Goode, Thomas	Congleton
1857	79	Goode, Charles	Congleton
1853		Goodrich, George	Dursley
1845		Goodson, Joseph	Beeston
1857		*Goodwin, John	Lower Clapton
1842		Gordelier, Paul William Gibbs	Sittingbourne

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1853		Gordon, John	Edinburgh
1853		Goss, Samuel	Barnstaple
1853		Gostling, Thomas P.	Diss
1853		Gould, Frederick	Kingston-on-Thames
1855		Govan, Alexander	St. Andrews
1841		Gow, Alexander	Wolverhampton
1857		Granger, Edwin John	Upper Clapton
1852		Grant, John S.	Aberdeen
1852	130	Gray, Alexander F.	Edinburgh
1852	131	Gray, John	Cupar Angus
1848		Gray, William	Rothwell
1853		Gray, Charles	Bilston
1853		Greaves, Abraham	Ironville
1844		Greaves, John	Bakewell
1842		Greaves, Richard	Ripon
1853		Green, Robert Poynton	Witham
1853		Green, George	Selby
1848		Green, John	Birkenhead
1853		Green, William M.	Liverpool
1842		Green, William	Bath
1854	245	Green, James	Droitwich
1853		Greenough, George	Manchester
1849		Greenwell, William C.	Gateshead
1848		Greenwood, John	Harrogate
1853		Gregory, Edward James	Cheltenham
1853		Greig, William	Glasgow
1852		Griffith, Robert	Carnarvon
1844		Griffith, Charles	Weston-super-Mare
1846		Griffith, Richard	Slough
1853		Griffiths, John	Manchester
1853		Griffiths, John	Narberth
1853		Griffiths, William	Swansea
1855	18	*Grindley, Robert D.	Chester
1853		Groom, William Bishop	Liverpool
1852		Grounds, George Field	Bishop Stortford
1842		Grounds, Ambrose	Ludlow
1841		Groves, Simon	Blandford
1854	95	Groves, Wellington E.	Blandford
1853	103	Groves, Thomas Bennett	Weymouth
1853		Groves, Edward	Hammersmith
1852		Grundy, Edwin	Lenton
1853		Gudgeon, George B.	Kimbolton
1842		Gulliver, Walker Job	Lutterworth
1842		Gundry, William	Bristol
1842		Gunner, George	Winchester
1841		Gurnell, Thomas	Dartford
1846		Guy, Guy	Helstone
1841		Gwatkin, James Thomas	Brighton
1852		Gwillim, John Cole	Newport, Monmouth
1853		Hadfield, John	Congleton
1841		Hadfield, William	Congleton
1853		Hadfield, William P.	Newark
1852		Haigh, Joseph	Leeds

Year of Membership.	No. of Certificate.	NAME.	ADDRESS.
1842		Haines, John Jenkins	Bromsgrove
1853	182	Hains, Barton John	Highgate
1843		Hall, Joseph	Salford
1852		Hall, Thomas	Newcastle-on-Tyne
1852	4	Hall, John Richard	Canterbury
1853		Hall, Richard	Brecon
1853		Hall, Henry R. F.	Hull
1853		Hall, Robert	Camborne
1842		Hall, George	Huddersfield
1842		Hall, John Dean	Wycombe
1849		Hall, Thomas	Grantham
1842		Hallsworth, Thomas	Manchester
1850		Ham, Charles H.	Exeter
1853		Ham, John	Nether Stowey
1841		Hambrook, Odden	Dover
1857		Hambrook, John B.	Dover
1853		Hamilton, Julius	Poole
1858		Hamilton, John T.	Dublin
1846		Hammon, Richard	Folkestone
1855	383	Handley, John	Wakefield
1853		Hannell, Edward W.	Rugby
1853	230	Hardie, James	Dundee
1853		Harding, James John	Sudbury
1853		Hardman, Thomas B.	Liverpool
1853		Hare, Josiah William	Harleston
1852		Hargreaves, Henry L.	Oldham
1842		Harold, William	Battle
1842		Harper, Henry	Leamington
1853		Harrington, Richard B.	Honiton
1852		Harrington, Arthur	Rochford
1854	203	Harris, William Harry	Northampton
1853		Harris, Daniel Roleby	Ware
1853		Harrison, Thomas	Leeds
1842		Harrison, Thomas	Bradford
1842		Harrison, James Parker	Carlisle
1847		Harrison, John	Nottingham
1848		Hart, James	Bolton
1852		Hart, Hugh	Glasgow
1853		Hart, George William	Hull
1841		Hartland, James	Bristol
1853		Hartley, Robert	Manchester
1853		Hartshorn, William H.	Ironbridge
1853		Hartshorn, Thomas	Ironbridge
1841		Harvey, Thomas	Leeds
1843		Harvey, John	Newark
1851		Harwood, John	Putney
1842		Haselar, Albert	Cranbrook
1848		Hatfull, Robert	Deptford
1842		Hattersley, John	Barton-on-Humber
1853		Hawkins, Henry Ford	Rugeley
1847		Haydon, Frederick Walter	Fordingbridge
1842		Haydon, Henry William	Dawlish
1857	447	*Hayes, James	Bristol
1853		Hayman, Alfred	Neath

Year of Membership.	No. of Certificate.	NAME.	ADDRESS.
1853		Hayward, Samuel H.	Gloucester
1845		Hayward, William G.	Reading
1845		Hayward, Edward	Ipswich
1853		Hayward, Charles	Manchester
1847		Hazell, Robert W.	Maidstone
1842		Head, John	Lewes
1846		Heald, William	Sleaford
1853		Healey, Samuel George	Hull
1841		Heath, Edward	Cromer
1845		Heathcote, Thomas Sarl	Newcastle-under-Lyne
1847		Heaton, John Scholes	Manchester
1857	370	Heelas, Henry Martyn	Reading
1842		Hellowell, Daniel	Leeds
1856	231	Helmrich, William	Ayr
1853	285	Heming, Robert	Sunderland
1842		Heming, Richard George	Worcester
1848		Hempsted, Robert	St. Leonard's
1853		Henderson, John	Glasgow
1853		Henley, Henry	Lyme Regis
1853		Henshall, John	Congleton
1853		Hensleigh, Henry	Plymouth
1841		Henson, Matthew	Dunstable
1853		Henthorn, Joshua	Oldham
1852		Hepworth, William	Manchester
1853		Herington, Joseph	Leighton Buzzard
1845		Hern, William Henry	St. Austell
1853		Hewett, William Henry	Great Yarmouth
1853		Hewlins, Edward	Leatherhead
1842		Hibbert, Walter	Neath
1845		Hick, Matthew Bussey	Wakefield
1846		Hick, Allan	Wath
1845		Hick, Joseph	Bradford
1842		Hickman, Joseph Frederick	Newbury
1852		Hicks, Robert	Lerwick
1853		Hicks, George	Rothesay
1853		Hifley, Richard James	Devonport
1853	96	Higgins, Thomas S.	Huddersfield
1843		Higgins, William	Chester
1842		Higgs, John Seagrave	Market Harborough
1842		Highway, Henry	Walsall
1853	192	Hill, Charles William	Burnley
1842		Hill, Richard	Bruton
1853		Hill, William	Manchester
1853		Hill, Simon	Plymouth
1841		Hill, John	Sheffield
1854	246	Hill, Thomas	Deddington
1853		Hinchcliffe, Ferrand G. U.	Manchester
1853		Hincks, Thomas R.	Chester
1853		Hinds, James	Coventry
1853		Hine, Alfred	Beaminster
1858		Hingston, Andrew H.	Liverpool
1853		Hinton, Charles Fox	Plymouth
1853		Hipkins, Matthew	Birmingham
1842		Hitchcock, Charles Edmund	Colchester
1842		Hitchcock, William Richards	Taunton

Year of Membership.	No. of Certificate.	NAME.	ADDRESS.
1853		Hobson, Charles	Beverley
1847	1	Hodder, Henry	Bristol
1853		Hoddy, Benjamin	Halstead
1852	133	Hodgeton, David	Brechin
1841		Hodgson, Edward	Stockton
1853		Hodkinson, Henry	Macclesfield
1853		Hogg, Henry	Bristol
1853		Hogg, Thomas	Bideford
1853		Holden, Richard	York
1853		Holdsworth, Thomas W	Birmingham
1854		Holland, William	Market Deeping
1841		Hollick, Thomas	Chatham
1841		Hollier, Elliott	Dudley
1843		Holt, George Palmer	Bexley Heath
1853		Holt, Richard Wylde	Seacombe
1853	13	Hooker, Thomas E	Wellington
1842		Hooper, Henry	Brighton
1853		Hopper, Richard	Sunderland
1841		Hopwood, Henry J. S.	Richmond, Surrey
1841		Horner, Stephen	Hartlepool
1845		Hornsby, John Harwood	Odiham
1857	174	Hornsby, George G.	Cheltenham
1853		Horsey, James	Portsea
1851		Houghton, James	Liverpool
1853		Houghton, Thomas	Oxford
1856		Houlton, James	Wetherby
1841		Howard, Robert	Stratford-le-Bow
1853		Howard, John Eliot	Stratford-le-Bow
1853		Howard, Richard	Tunbridge Wells
1842		Howard, John	Manchester
1842		Howman, Philip	Winchcombe
1846		Howorth, James	Doncaster
1853		Howroyd, Joseph	Salford
1855		Howson, Thomas J	Gateshead
1851		Howson, Thomas B	Oxford
1842		Hudson, Richard	Kendal
1851	10	Huggins, George Thomas	Barnet
1849		Hughes, Edward	Altrincham
1842		Hughes, Samuel	Stourbridge
1842		Hulbert, Robert Skeat	Basingstoke
1853		Hulme, John Hughes	Norwich
1853		Hulme, Thomas	Oldham
1842		Humphreys, Matthew	Nottingham
1842		Humphreys, Thomas	Birmingham
1851		Hunt, Thomas	Grantham
1855	104	*Hunt, Richard	Andover
1852	135	Hunter, David	Edinburgh
1853		Hunter, John	Gosport
1842		Huntley, John	Wimborne
1855		Hurdon, James	Appledore
1853		Hurman, John	Bridgewater
1844		Hurst, William T. H.	Hempstead
1842		Hurst, John	Louth
1845		Husband, Matthew	Exeter

Year of Membership.	No. of Certificate.	NAME.	ADDRESS.
1853		Iliffe, Thomas	Nuneaton
1853		Ingham, Henry	Wellingore
1853		Ingham, Richard R.	Manchester
1853	306	Isaac, George Washington	Bristol
1852		Iverach, William	Kirkwall
1854	136	Jaap, John	Glasgow
1850		Jackson, William R. P.	Ewell
1842		Jackson, William George	Hartlepool
1841		Jackson, Thomas	Manchester
1852		Jackson, Robert R.	Liverpool
1852	105	Jackson, William	Stowmarket
1853		Jackson, John	Morley
1853		Jackson, Henry	Liverpool
1853		Jackson, Clay	Chesterfield
1853		James, John Parry	Cardiff
1853		James, Henry	Bognor
1853		Jameson, Walter C.	Bath
1853		Jefferson, Peter	Leeds
1853		Jeffery, Russell	Cheltenham
1848		Jeffery, Moses Williams	Devonport
1846		Jenkins, Henry Maine	Christchurch
1853		Jenkins, John	Peterchurch
1841		Jenner, Richard B.	Sandgate
1855	286	Jennings, John Edgell	Southampton
1841		Jennings, William	Halifax
1842		Jennings, Reginald	Hereford
1853		Jennings, John E. H.	Sheffield
1853		Jessop, Jonathan	Halifax
1852		Jobson, William	Dundee
1853		Johnson, Thomas	Leek
1841		Johnson, John H.	Liverpool
1853		Johnson, John B.	Uttoxeter
1841		*Johnson, Samuel	Liverpool
1858	390	Johnson, George	Birmingham
1853		Jones, John	Aberdare
1842		Jones, Edward Bowen	Carmarthen
1845		Jones, Samuel Urwick	Leamington
1845		Jones, John	Holywell
1842		Jones, William	Liverpool
1853		Jones, David	Narberth
1853		Jones, Owen Lewis	Liverpool
1848		Jones, Charles	Birkenhead
1853		Jones, Ellis Powell	Rhyl
1848		Jones, James	Salford
1841		Jones, Charles	Hanley
1853		Jones, Thomas J.	Newport
1841		Jones, William B.	Kingston-on-Thames
1853		Jones, William Thorpe	Southwell
1844		Jones, Oliver Ellis	Welshpool
1853		Jones, Thomas	Welshpool
1850		Jones, William A.	Waterloo
1842		Jones, William	Hastings
1857	115	*Joy, Francis William	Cardiff
1842		Judson, Thomas	Ripon

Year of Membership.	No. of Certificate.	NAME.	ADDRESS.
1846		Jull, Thomas	Romford
1853		Keall, Powell Skinner	Bristol
1845		Keeling, George Ratcliffe	Epsom
1852		Keene, Alfred ..	Leamington
1853		Keith, James	Aberdeen
1853		Kellett, Henry	Salford
1852	137	Kemp, David	Portobello
1841		Kemp, Grover	Brighton
1854		Kemp, John	Brighton
1848		Kemp, William	Horncastle
1841		Kendall, Frederick	Stratford-on-Avon
1844		Kendall, George	Masham
1853		Kennedy, William	Glasgow
1853		Kent, Alfred	Iffley
1853		Ker, Thomas Foster	Manchester
1853		Kernick, Samuel Penrose	Cardiff
1843		Kernot, Joseph	Naples
1843		Kernot, Septimus	Naples
1852		Kerr, Thomas	Edinburgh
1847		Kershaw, James	Southport
1842		Kiddy, Samuel	Belper
1841		Kimbell, Henry	Knowle
1853		Kimberly, George	Bilston
1841		Kinch, Charles	Henley-on-Thames
1852		Kinder, John	Glossop
1853		King, William George	Market Drayton
1841		King, Thomas Simmons	Rochester
1853		King, William	Soham
1853		King, Charles Montague	Southend
1853		King, Ellis	Southend
1858	234	Kinninmont, Alexander	Glasgow
1854	276	Kirk, John	Maidstone
1853		Kirk, Charles	Hartley Row
1853		Kirk, Thomas	Liverpool
1853		Kirkbride, William	Penrith
1842		Kitching, Charles	Haverhill
1853		Knapman, John	Exeter
1842		Knight, Edward Sackville	Bridport
1858		Knight, John	Cambridge
1841		*Knott, Thomas	Exeter
1844		Knowles, Richard John	Demerara
1852		Knowles, John J	Sandwich
1853	187	Laird, William	Dundee
1853		Lamotte, Thomas Gallye	Bristol
1853		Lancaster, Henry	Croydon
1842		Land, John	Leeds
1853		Lane, Joseph	Hampstead
1842		Langford, William	King's Lynn
1858	100	Langman, Peter	Chatteris
1843		Lansdale, Ralph	Wycombe
1841		Large, Henry	Nottingham
1853		Lasham, John	Dedham
1841		Lathbury, Robert	Liverpool
1842		Lavers, Thomas Howard	Blackheath
1855	378	*Lavington, Edwin	Bristol

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1853		Law, William	Forfar
1842		Lea, Henry Clairmont	Hastings
1853		Lea, Samuel	Ellesmere
1841		Lea, John Wheeley	Worcester
1855		Leadbetter, William Austin	Melton Mowbray
1841		Leay, Joseph	Birmingham
1846		Leggatt, John Tudway	Wareham
1853		Leighton, John H.	Durham
1852		Leith, James	Edinburgh
1853	138	Lever, William	Hastings
1853		Lewin, Edwin C.	Boston
1841		Lewin, William	Plymouth
1853		Lewis, Thomas V.	Ebbw Vale
1856	310	Lewis, Thomas Cooper	Rugby
1857		Limon, Henry	Burgh
1841		Lindsay, Robert	Edinburgh
1857	406	Lingwood, James Grace	Northampton
1841		Lines, George	Hertford
1849		Linsley, Thomas	York
1844		Lister, George	Cottingham
1854	215	Littlefield, James Wavell	Ventnor, Isle of Wight
1842		Lloyd, Edmund	Richmond
1856	436	Lloyd, Henry	Richmond
1841		Lloyd, Frederick Rugge	Highgate
1853		Lloyd, Thomas Henry	Woolwich
1853		Lloyd, Henry	Deptford
1853		Lock, William	Boston
1846		Lockyer, George	Deptford
1853		Loggin, Charles Frederick	Stratford-on-Avon
1858	479	Long, Henry	Croydon
1853		Longfield, Joseph	Leeds
1853		Longrigg, John	Appleby
1853		Lord, Ellis	Rochdale
1853		Lord, Charles	Todmorden
1841		Lofthouse, James	Hull
1853		Loveitt, George	Coventry
1841		Lovett, John	Gloucester
1841		Lowe, Thomas	Liverpool
1842		Lowndes, Henry	Stockport
1841		Loye, Philip	Plymouth
1853		*Luff, William	Oxford
1853		Lumsden, James	Peterhead
1853		Lupton, Thomas	York
1842		Lynch, John R.	Manchester
1842		Mabson, William	Great Yarmouth
1842		Macfarlan, John F.	Edinburgh
1852	139	Macfarlane, Wardlaw	Edinburgh
1853		McDiarmid, John B.	Deal
1853		McGregor, Andrew	Glasgow
1853		McGuffie, John R.	Liverpool
1841		Mackay, John	Edinburgh
1852		Mackenzie, Duncan	Edinburgh
1852		Mackintosh, Archibald	Rothesay
1856	140	Mackintosh, James	Galashiels

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1841		Maddock, William	Tunbridge Wells
1853		Madge, James C.	Devizes
1848		Maggs, Samuel Blount	St. Leonard's
1845		Maggs, Thomas C.	Yeovil
1845		Maleham, Henry	Sheffield
1844		Maling, William	Newcastle-on-Tyne
1842		Manfield, John W.	Salford
1853		Manifold, John J.	Weaverham
1853		Mansley, Allen	Leigh
1841		Manthorp, Samuel	Colchester
1850		March, William	Newark
1845		Marder, John J. W.	Lyme Regis
1857	481	*Maries, Henry Davies	Watford
1846		Marks, George	Bradford-on-Avon
1857	205	Marks, Edward L.	Liverpool
1853		Marlor, Jabez	Lees, near Oldham
1849		Marrison, George O. R.	Tasmania [dale
1845		Marsden, Joseph	Middleton-on-Tees-
1852		Marsh, Joseph T.	Wirksworth
1842		Marsh, William M.	Sevenoaks
1842		Marshall, John F.	Gainsborough
1853	311	Marshall, Robert	Boston
1842		Marshall, James A.	Waltham Abbey
1842		Marston, Richard	Ludlow
1842		Martin, Edward W.	Guildford
1845		Martin, Thomas	Lewes
1841		Martin, John	Bristol
1841		Martin, Charles	Strood
1851		Martin, Henry G.	St. Albans
1853		Martin, Thomas	Liverpool
1853		Martyn, John Jones	Brighton
1853		Mason, Joseph W.	Cirencester
1842		Mason, William W.	Manchester
1853		Mason, William	Hastings
1853		Massey, Joseph	Oldham
1853		Mather, William	Manchester
1853		Maunder, Alexander	Weston-super-Mare
1848		Maunder, Frederick	Sheffield
1853		Mawson, John	Newcastle-on-Tyne
1842		May, Enoch	Tewkesbury
1848		Maynard, Robert H.	Brandon
1842		Mays, Robert James John	South Shields
1843		Meadows, John	Leicester
1842		Mease, Solomon	North Shields
1853		Mease, Robert D.	North Shields
1842		Meatyard, Robert	Basingstoke
1853		Medd, Joseph	Gloucester
1842		Medcalf, Benjamin	Ware
1843		Medcalf, Ebenezer	Lower Tooting
1857	215	Medley, William	Derby
1845		Medwin, Aaron	Blackheath
1853		Melhuish, John	Taunton
1853		Meredith, Edwin Richard	Bristol
1850		Merrick, Thomas J.	Northampton

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1853		Merryweather, Charles	Leicester
1854	106	*Metcalfe, Christopher L.	Hull
1853		Michell, John A.	Falmouth
1853		Millais, Thomas	Jersey
1853		Miller, Jeptha	Saffron Walden
1842		Miller, Charles	Oxford
1853		Miller, William Henry	Sheffield
1853		Miller, John Thomas	Sheffield
1853		Mills, James Arthur	Dereham East
1853		Milton, William	Exeter
1847		Mitchell, John	Manchester
1853		Mitchell, Thomas	Sunderland
1842		Mole, William Tingey	St. Neots
1844		Moor, Joseph	Bury St. Edmunds
1856	40	Moore, Edward H.	Shoreham
1846		Moore, John	Blackpool
1842		Moore, Henry	Worcester
1841		Moore, R. C.	Brighton
1841		Mordaunt, Alfred	Southampton
1841		*Mordaunt, John	Tunbridge Wells
1853		Morgan, William	Newport, Monmouth
1844		Morris, Alfred Philip	Stourbridge
1853		Morris, Philip Henry	Newport, Monmouth
1844		*Morse, George	Mortlake
1853		*Morton, Jameson	Ramsbottom
1852		Morton, John	Durham
1845		Morton, Henry	Ramsgate
1844		Morton, George	Stratford-le-Bow
1849		Moss, William	Carlisle
1853		Mount, William	Canterbury
1842		Mount, John	Manchester
1853		Mousley, William	Redditch
1841		Mullett, Charles	Ilminster
1847		Mumbray, Robert George	Manchester
1853		Mumby, Charles	Gosport
1853		Munday, Edward Smith	Worthing
1853		Murdoch, William	Glasgow
1852		Murdoch, George	Glasgow
1849	63	Murdoch, James	Glasgow
1853		Murdoch, David	Falkirk
1841		Muriel, Harry Brooke	Brighton
1849		Muskett, Charles	Derby
1842		Muskett, James	Harleston
1844		Musson, Telemachus G.	Birmingham
1842		Napier, James	Edinburgh
1853		Narracott, Henry	Torquay
1848		Naftel, Thomas S.	Guernsey
1856	262	Needham, Slater	Leicester
1842		*Negus, Samuel	Northampton
1853		Newbery, Henry	Biggleswade
1853		Newby, William Henry	Perth
1853		Newcome, John	Grantham
1854		Newman, Robert	Bewdley
1845		Newman, Thomas	Hartley Row
1853		Newman, Walter F.	Falmouth

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1853		Newton, George	Newcastle
1847		Newton, Christopher	Edinburgh
1853		Niblett, John	Stroud
1852		Nicol, George	Pulteney Town
1853		Nicholas, John	Narberth
1841		Nicholls, James	Stourbridge
1843		Nightingale, Henry L.	Egham
1845		Nind, George	Wandsworth
1853		Nix, John K.	Billericay
1841		Noakes, Richard	Brighton
1846		Northcroft, Jonathan	Plymouth
1853		Norwood, Thomas	Hastings
1842		Oakey, Joseph Malpas	Preston
1853		Oldham, William T.	Wisbeach
1844		*Oliver, William	Bristol
1853		Oliver, John	Liverpool
1842		Orange, John	Portsea
1845		Otter, William	Bloxham
1842		Overbury, Henry	Alcester
1845		Owen, Griffith	Caernarvon
1845		Owles, James	Bungay
1842		Owles, John	Yarmouth
1842		Pain, George Alison	Cambridge
1858	368	Pain, G. A.	Cambridge
1842		Paine, William	Canterbury
1841		Palk, Edward	Southampton
1841		*Palk, John	Exeter
1847		Palmer, Faithful	Cheltenham
1842		Palmer, Thomas J.	East Grinstead
1842		Parker, Edward	Carlisle
1853		Parker, Frederick	Derby
1853		Parker, John	Birmingham
1853		Parker, Matthew	Bath
1853		Parker, William Henry	Nottingham
1841		Parker, Thomas	Halifax
1842		Parkes, Joseph	Atherstone
1842		Parkes, Thomas	Woolwich
1853		Parkes, John C.	Woolwich
1854	312	*Parkes, John P.	Manchester
1842		Parkinson, Thomas	Liverpool
1847		Parkinson, Robert	Bradford
1841		*Parnell, John	Peterborough
1842		Parsons, Thomas	Leicester
1850		Parsons, William	Portsmouth
1353		Parton, Joseph	Nantwich
1353		Pasmore, George	Exeter
1853		Pate, Henry Thomas	Ely
1853		Paterson, William	Aberdeen
1853		Patterson, George	Stamford
1858	453	*Patterson, Douglas John	Mansfield
1853		Pattinson, Richard John	Carlisle
1841		Paul, Horace	Halsted
1853		*Paulden, William	Altrincham
1841		Payne, Reuben Craven	Bridgewater
1853		Payne, William Frederick	Aylesbury

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1854	314	Peake, Henry	Dover
1855	313	Peake, James	Walmer
1842		Pearce, Thomas	Gloucester
1853		Pearce, James	Kidderminster
1852		Pearless, John	East Grinstead
1853		Pearman, Henry	Stourbridge
1842		Pearson, Charles James	Swansea
1851		Pearson, Edward	Liverpool
1842		Peart, David	Dorking
1842		Peat, Walter	Fareham
1853		Peatson, Henry Robert	Salford
1853		Pegg, Herbert	Birmingham
1852		Penney, William	Poole
1853		Penrice, Joseph	Workington
1851		Peppercorn, Benjamin	Lincoln
1855		Perfect, George	Portsea
1841		Perrins, William	Worcester
1843		Perry, Solomon	Tavistock
1853		Pertwee, Edward	Romford
1853		Pertwee, Alfred R.	Chelmsford
1853		Phillips, John	Birmingham
1852		Phillips, Edward James	Newport, Monmouth
1853		Phillips, John	Newport, Monmouth
1856	326	Phillips, William Thomas	Carmarthen
1845		Philpott, John	Bromyard
1842		Pickering, Henry	Leicester
1853		Pickering, Atkinson	Hull
1845		Pickup, Thomas Hartley	Blackburn
1841		Pickup, John	Manchester
1848		Pickup, Varey	Salford
1858	431	*Pidduck, John	Brompton
1853		Pidgeon, Henry	Shrewsbury
1853		Pidgeon, John	Taunton
1841		Pierce, Edward Lloyd	Shelton
1853		Pilley, Samuel	Boston
1853		Pilley, John	Boston
1853		Piquet, John	Jersey
1853		Pissey, William	Rayleigh
1853		Pitts, Robert Christopher	Norwich
1853		Player, Edmund	Bristol
1842		Plomley, James Foulis	Rye
1842		Pocklington, James	Sydenham
1853		Pollard, William J.	Nailsea
1852		Ponting, Thomas Cadby	Bristol
1845		Pooley, John Carpenter	Bath
1854	15	Porter, William Henry	Rochester
1846		Portway, John	Bury St. Edmunds
1855		Poulton, John	Newton Abbott
1852		Powell, Frederick W.	Leith
1842		Powell, John	Shaftesbury
1842		Powell, Edward	Winchester
1852		Power, Edward	Walton-on-Thames
1841		Pratt, John	Chichester
1846		Pratt, John	Bradford
1853		Pratt, Richard Munton	Otley

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1853		Priestlay, Henry	Pontefract
1841		Priestley, John	Liverpool
1852		Prince, Henry ...	Taunton
1855	290	*Pring, Walter	Taunton
1855		Prior, George T.	Oxford
1842		Prockter, Richard Edgcumbe	Cheltenham
1841		Procter, William	Liverpool
1853		Procter, Joseph	Barnard Castle
1848		Proctor, William	Newcastle
1841		Proctor, William B.	Newcastle
1857		Proctor, Barnard S.	Newcastle
1853		Prott, William	Huntley
1852	144	*Prott, William, jun.	Huntley
1842		Prout, Robert	Milton Abbott
1852	327	Prowse, Charles	Bristol
1853		Pryer, William Symes	Axminster
1852		Pullin, Edwin	Northampton
1841		Purdue, Thomas	Witney
1855	355	*Pyne, Joseph J.	Manchester
1853		Quine, James	Douglas, Isle of Man
1851		Radford, Isaiah C.	Devonport
1841		Radley, William Valentine	Sheffield
1853		Rae, James	Chicago, U.S.
1842		Raimes, Richard	Edinburgh
1853		Rait, Robert C.	Partick
1853		Ralfs, Henry Charles	Brentford
1853		Ramsey, Henry P.	Ashford
1841		Ramskill, Parson	Leeds
1841		Randall, Edward Mayor	Southampton
1845		Randall, William Brodribb	Southampton
1853		Randall, Thomas	Wareham
1853		Randleson, William	Whitehaven
1853		Ranken, James Anderson	Forfar
1848		Rankin, William	Kilmarnock
1842		Ransford, Samuel	Cleveden
1853		Ransom, William	Hitchin
1853		Ransome, Thomas	Manchester
1851		Rastrick, George T.	Geelong
1853		Rastrick, William Henry	Portsea
1842		Rastrick, Joseph Linington	Southsea
1842		Rastrick, John Alfred	Woolwich
1841		Raw, John	Preston
1853		Rawdin, Joseph	Jedburgh
1854	206	Rayner, John	Nottingham
1852		Rayner, John	Uxbridge
1842		Reading, Robert Grant	Warwick
1841		Readman, William	Leighton Buzzard
1842		Redfern, John	Ashby-de-la-Zouch
1853		Redmayne, Christopher	Warrington
1853		Rees, William Henry	Dartmouth
1842		Reeve, William	Canterbury
1853		Reid, David	Aberdeen
1853		Reid, John	Montrose
1857	251	Reid, Neil	Perth

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1856		Reilly, William Charles	Hampstead
1845		Reinhardt, Johaan Christian	Hull
1841		Reinhardt, George	Leeds
1848		Rendall, John M.	Torquay
1842		Reynolds, William	Halesworth
1854	109	Reynolds, Richard	Leeds
1849		Rhodes, Frank	Wycombe
1853		Rhodes, James	Manchester
1853		Rich, Thomas	Weston-super-Mare
1853		*Richards, William	Falmouth
1853		Richardson, Allen	Manchester
1842		Richmond, Robert	Leighton Buzzard
1852		Righton, Job Castle	Tamworth
1842		Rimmington, Felix U.	Bradford
1842		Ritson, John George	Sunderland
1842		Ritson, Thomas	Sunderland
1847		Roberton, James	Manchester
1853		Roberts, Thomas A.	Conway
1852		Roberts, Griffiths J.	Holyhead
1842		Roberts, Charles	Westbury
1841		Roberts, Albinus	St. Albans
1851		Roberts, Edwin	Liverpool
1852		Robertson, James	Edinburgh
1853	331	*Robertson, Thomas Berkley	Cullen
1854		Robinson, Levi	Alford
1842		Robinson, James Mowld	Beverley
1855	249	Robinson, Ralph	Durham
1842		Robinson, Charles S.	Hammersmith
1855	193	Robinson, Benjamin	Pendleton
1853		Robinson, James	Nottingham
1851		Robson, Thomas	Brighton
1842		Robson, George	Durham
1853		Rodgerson, William	Liverpool
1842		Roe, Thomas	Ollerton
1853		Roe, William Charles	Blackheath
1853	5	Rogers, John Robinson	Honiton
1853		Rogers, William	Maidstone
1842		Rogers, John	Ledbury
1842		Rogerson, Michael	Bradford
1853		Rome, Robert M.	Langholm
1853		Rook, Edward	Sittingbourne
1853		Rooker, Abel	Wolverhampton
1851		Roose, Robert	Ruthin
1845		Ross, Stephen	Lancaster
1853		Row, Charles	Devonport
1843		Rowe, John	Plymouth
1853		Rowlands, Thomas	Epping
1853		Ruffe, Frederick	Tamworth
1846		Russell, Thomas	South Shields
1853	84	Russell, Charles J. L.	Windsor
1853		Rust, James	Harwich
1853		Sagar, Henry	Leeds
1841		Salisbury, John	Sheffield
1858	219	Salisbury, William Bryan	Leicester

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1842		Sanders, Henry Wotton	Bristol
1847		Sandiland, Robert B.	Bicester
1853		Sangster, John	Aberdeen
1853		Satterley, William B.	Guernsey
1845		Saunders, David Price	Haverfordwest
1853		Saunders, George J.	Oswestry
1841		Savage, William Dawson	Brighton
1853		Sawer, William	Stroud
1841		Sawyer, Thomas	Ramsgate
1842		Sawyer, James	Carlisle
1853		Saxby, Henry	Lewes
1852		Scarrow, William	Sunderland
1846	2	Schacht, Frederick George	Clifton
1856		Scholefield, George	Birkenhead
1853		Scott, Edward	Birmingham
1856	426	Searby, William M.	Norwich
1854	239	Seath, Alexander	Dunfermline
1847		Seaton, John Love	Hull
1841		Selfe, Isaac	Bristol
1852	60	Sessions, Joseph James	Godalming
1843		Severs, Joseph	Kendal
1846		Sewell, James C.	Sheffield
1853		Sewell, John Holmes	Swindon
1841		Seyde, John F.	Willenhall
1841		Shackel, John Well	Maidenhead
1853		Shadford, Major	Spalding
1853		Sharland, Edmund T.	Bristol
1853		Sharp, Benjamin	Warrington
1847		Sharp, Henry	Christchurch
1842		Sharpe, Joseph	Salford
1841		Sharples, William	Preston
1843		Sharples, George	Preston
1853		Shattock, John	Taunton
1848		Shaw, John	Liverpool
1842		Shaw, Charles Wright	Liverpool
1842		Shaw, Alexander Henry	Stockport
1854		Shenstone, James B.	Colchester
1853		Shepherd, James	Aberdeen
1857	371	Shepherd, George Prentis	Guildford
1848		Shepperley, James	Nottingham
1842		Shillcock, Joseph Bradley	Bromley, Kent
1841		Shum, Henry	Swansea
1853		Sidebottom, William	New Mills
1842		Silvester, Joseph	Knutsford
1853		Sim, James	Aberdeen
1853		Sim, George	Kelso
1847		Simmons, Frederick	Worcester
1842		Simonds, William	Boston
1843		Simpson, John	Hull
1842		Simpson, Thomas	Stowmarket
1853		Sinclair, William	Aberdeen
1853		Sincock, William	Andover
1852		Sircom, Richard	Bristol
1841		Sirett, George	Buckingham

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1843		Slater, William Boocock	Blackburn
1853		Slayter, George	Reading
1852		Smale, William	Oswestry
1853		Smale, Richard Bill	Oswestry
1843		Smallwood, John Wright	Macclesfield
1853		Smart, Nevill	Littlehampton
1841		*Smeeton, Edward	Leeds
1853		Smethurst, Richard L.	Salford
1853		Smith, John	Aberdeen
1853	169	Smith, William	Brighton
1853		Smith, William	Bridlington
1841		Smith, Nathaniel	Cheltenham
1841		Smith, Thomas	Colchester
1842		Smith, William	Sutton Coldfield
1842		*Smith, William	Abingdon
1842		Smith, James Russell	Woodbridge
1853		Smith, Henry	Eccleshall
1842		Smith, Henry	Edinburgh
1853		Smith, Josias	Hyde
1843	31	Smith, John	Southampton
1842		Smith, Alfred	Tenterden
1853		Smith, Benjamin	Cardiff
1842		Smith, William	North Shields
1842		Smith, William	Woolwich
1853		Smith, James S. T. W.	Haltwhistle
1853		Smith, Edward	Norwich
1849		Smith, William	St. Andrews
1856	416	*Smith, Thomas J	Hull
1853		Smyth, Walter	Merthyr Tidvil
1842		Snape, Edward	Birmingham
1842		Snelling, Francis	Horsham
1841		Southall, William	Birmingham
1841		Southall, Thomas	Birmingham
1850		Southall, William, jun.	Birmingham
1842		Sowerby, John	Carlisle
1853		Sowter, William Barter	Leicester
1852		Spence, Thomas B.	Dundee
1843		Spencer, Charles	Gravesend
1842		Spencer, William	Monmouth
1853		Spencer, William Henry	Burnham Market
1853		Spencer, Thomas	Wokingham
1853		Spencer, George	Lincoln
1842		Spettigue, Joseph	Launceston
1842		Spicer, Thomas	Ilfracombe
1853		Spokes, Peter	Reading
1845		Spong, Thomas Willsden	Biggleswade
1853		Spurr, John	York
1842		Squire, William	Hanwell
1853		Squire, William	Nottingham
1853		Squire, William	Hull
1853		Stafford, William	Gloucester
1842		Standring, Thomas	Manchester
1842		Stantial, John	Corsham
1847		Stead, William	Hoebury

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1856	291	Steel, Henry	Shefford
1853		Steel, Samuel	Beccles
1855	148	Steele, David	Edinburgh
1841		Steele, Thomas	Bath
1853		Sterriker, John	Driffield
1853		Stephens, Thomas	Merthyr Tydvil
1858	492	*Stephenson, John B.	Edinburgh
1849		Stevens, John	Birmingham
1852		Stevens, George	Strood
1846		Stevenson, Richard	Derby
1842		Steward, Charles S. Dale	Yarmouth
1854	278	Steward, Alfred	Yarmouth
1847		Steward, William	Bridgnorth
1841		Steward, Josiah	Kidderminster
1841		Steward, Theophilus	Kidderminster
1853		Steward, John	Brierley Hill
1858		Stewardson, Henry	Bedford
1841		Stiell, Gavin	Dunfermline
1858	491	*Stirling, George	Dunoon
1853		Stoddart, William Walter	Bristol
1853		Stone, John	Exeter
1852		Stonham, Thomas G.	Maidstone
1841		Stott, William	Sowerby Bridge
1853		Strange, William Bond	Bristol
1847		Strawson, Henry	Crewkerne
1856	292	Stroud, John	Bristol
1853		Stuart, Henry James	Ingatestone
1842		Stuart, Charles	Woolwich
1853		Stuart, Henry W.	Woolwich
1853		Sturton, Joseph	Cambridge
1841		Sturton, John	Peterborough
1855	394	*Sturton, Richard	Peterborough
1853		Sugden, Samuel	Newchurch
1853		Suggate, Henry Ezra	Great Yarmouth
1852		Sumner, Robert	Liverpool
1855	170	Sumner, William	Birmingham
1852		Sumner, John	Birmingham
1853		Sutcliffe, William	Stalybridge
1853		Sutherland, John	Aberdeen
1853		Sutterby, Jonathan N.	Sutton Bridge
1853		Sutton, Francis	Norwich
1843		Symonds, John	Aylsham
1853		Symons, William	Dunster
1854		Symons, John Netherton	Penzance
1847		Sympson, Charles	Lincoln
1852	149	Tait, William	Edinburgh
1841		Tanner, Nicholas William	Exeter
1853		Taplin, Joseph	Bristol
1847		Tarzewell, Richard	Braintree
1841		Tatham, John Walkingame	Barnstaple
1852		Tatham, Leonard F.	Bradninch
1845		Tayler, William Henry	Warminster
1841		Taylor, John	Preston
1852		Taylor, John Hawarden	Preston
1853		Taylor, Thomas John	Preston

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1842		Taylor, James	Manchester
1853		Taylor, Henry	Manchester
1842		Taylor, Thomas H.	Manchester
1852		Taylor, John	Wakefield
1850		Taylor, Sydney	Pendleton
1842		Taylor, Edward	Rochdale
1853		Taylor, John	Rawtenstall
1854	362	Taylor, Richard	Ryde
1848		Taylor, John Usher	Bedford
1842		Taylor, Thomas	Stalybridge
1842		Taylor, Stephen	Westbury
1848		Teasdale, Thomas B.	Darlington
1842		Teear, John Manshaw	Leicester
1842		Telfer, Frederick	Oxford
1853		Templeton, John	Glasgow
1842		Thomas, John Holliday	Boston
1852		Thomas, Robert	East Looe
1846		Thomas, Richard	Burnley
1853		Thomas, Morgan	Cardiff
1853		Thomas, John	Cowbridge
1853		Thomas, James	Bridge, Kent
1853		Thomas, James	Hythe
1853		Thompson, George	Alston
1841		Thompson, John	Thirsk
1846		Thompson, Edward	Otley
1853		Thompson, Henry	Norwich
1849		Thompson, John	Liverpool
1842		Thompson, Henry	Middlesborough
1850		Thompson, Thomas	Richmond, Yorkshire
1853		Thompson, William	Sunderland
1846		Thompson, Andrew	Carlisle
1853		Thonger, Gilbert	Birmingham
1853		Thorne, John	Bedford
1853		Thornton, John	Wedmore
1853		Thornton, Edward	Lyme Regis
1842		Thornton, Samuel	Exmouth
1857	417	Thornton, John Barber	Dover
1853		Thurland, Edward	Oxford
1853		Tiernan, Robert	Liverpool
1853		Timothy, Thomas Norris	Reading
1841		Titherington, Thomas A.	Liverpool
1843		Tomlinson, Charles Knowles	Lincoln
1853		Tomlinson, William	Glossop
1847		Tonge, James Scawin	York
1853		Toone, Joseph Vidler	Warminster
1853		Townsend, John H.	Bristol
1853		Townson, Thomas	Leamington
1842		Tozer, Richard John	Exeter
1841		Tribe, John	Chatham
1841		*Trix, John	Exeter
1852	150	Trotter, George	East Linton
1841		Trueman, William	Durham
1853		Truman, Francis C.	Jersey
1841		Tryon, William George	Portsea

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1842		Tuck, William H.	Torquay
1857	342	*Tuck, Francis	Oxford
1843		Tucker, Charles	Bridport
1853		Tucker, James	Gloucester
1853		Tuff, John	Enfield
1842		Tunley, John	West Bromwich
1853		Turner, Robert	Oundle
1845		Turner, Thomas	Newcastle-under-Lyne
1848		Turner, John A.	Liverpool
1856	264	Turner, Walter	Mold
1851		Turner, Frederick E.	Holywell
1854	265	Turner, William Henry	Birkenhead
1853	162	Turney, Samuel B.	Cambridge
1853		Turton, Luke	Leeds
1853		Turton, Thomas J.	Howden
1841		Tylee, John P.	Bath
1853		Urquhart, John	Aberdeen
1852		Urwin, John	Bedlington
1853		Veitch, James	Dunse
1853		Veitch, William	Shildon
1845		Vincent, Philip	Fulham
1841		*Visick, Robert Goodyear	Brighton
1853		Vose, Thomas	Liverpool
1842		Wain, William	Ripley
1842		Wainwright, James	Howden
1842		Waite, Joseph	Cheltenham
1847		Walker, Edward	Newcastle-on-Tyne
1841		Walker, George Clarke	Doncaster
1842		Walker, Edward Hawxby	Doncaster
1842		Walker, William	Malmsbury
1853		Walker, John	Bradford
1846		Walker, William H.	Southport
1853		Walker, John C.	Birmingham
1853		Walker, Thomas D.	Liverpool
1842		Walkinton, William	Tenby
1848		Wall, William James	Tottenham
1857	75	Wallworth, David	Maldon
1854	343	Walsh, Edward	Manchester
1852		Walsh, William	Oxford
1853		Walter, Joseph	Horncastle
1848		Walton, John	Sunderland
1842		Warburton, Thomas	Bolton
1841		Ward, James	Falkingham
1845		Ward, James	Richmond, Yorkshire
1853		Ward, Francis	Battle
1851		Ward, William	Sheffield
1853		Wardle, William Henry	Stalybridge
1842		Warren, James	Portsea
1842		Warrior, William	Northallerton
1853		Waterall, George	Nottingham
1853		Waterall, George Edwards	Nottingham
1853		Waterfall, William	Newcastle
1847		Waterson, John	Birmingham
1842		Watkins, George H.	Walsall

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1853		Watkinson, Thomas	Bilson
1841		Watlock, John Dawson	Wandsworth
1853		Watlock, Benjamin D.	Battle
1846		Watson, Henry	Cambridge
1847		Watson, Edward M.	Worle
1853		Watt, James	Haddington
1853		Wavell, John	Ryde
1853		Wearing, William	Lancaster
1853		Wearing, William Henry	Liskeard
1848		Wearing, Richard	Liverpool
1842		Weaver, Frederick	Wolverhampton
1853		Webb, Thomas S.	Bilston
1853		Webber, George William	Torquay
1853		Webster, Edwin P.	Newcastle-on-Tyne
1852		Webster, Samuel M.	Warrington
1845		Weeks, Caleb	Torquay
1853		Welch, Charles	Nottingham
1844		Weller, George	Windsor
1850		Wellington, Frederick G. N.	South Petherton
1842		Wellington, James Martin	Oakham
1853		Wellman, William Richard	Jersey
1852		Welsh, Alexander	Dalkeith
1853		West, Henry James	Coventry
1850		West, Isaac	Oxford
1856		West, William	Henfield
1846		Westall, Richard H.	Ramsgate
1853		Westmacott, George	Manchester
1854	180	Wharrie, Decimus	Liverpool
1854	156	*Wheeler, Francis	Norwich
1847		Wheeler, John	Chipping Sodbury
1846		Wheeler, James Edward	Ryde
1842		Whimpray, John	Lancaster
1853		Whitall, James	Chertsey
1853		White, Frank	Nottingham
1842		White, Robert Rowles	Dursley
1850		White, Luke P.	Peniston
1842		White, Thomas	Bilston
1846		White, George	Havant
1846		Whitehead, Edwin	Fleetwood
1853		Whitehead, John	Rochdale
1842		Whitfield, John Lockley	Worcester
1846		Whitlock, Edwin	Salisbury
1853		Whittaker, William	Runcorn
1852		Whittaker, Ellis	Salford
1853		Whittle, Samuel	Leigh
1841		Whitton, George	Horncastle
1852		Whitwell, John	Thirsk
1845		Wibmer, Lewis Michael	Tunbridge
1853		Wice, Jonathan Haigh	Wakefield
1842		Wigg, John Goddard	Lynn
1845		Wiggin, John	Ipswich
1853		Wild, Joseph	Hyde
1853		Wild, David	Oldham
1847		Wilde, Eli	Manchester

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1853		Wilding, William	Liverpool
1852		Wilkes, Seth Martin	Tewkesbury
1850		Wilkes, D. Tyers	Upton-on-Severn
1842		Wilkes, William	Bromyard
1858		Wilkes, David	Bredon
1850	73	Wilkinson, William	Manchester
1854		Williams, Joel D.	Bodmin
1853		Williams, William	Haverfordwest
1857	474	*Williams, Henry Levi	Newport, Monmouth
1853		Williams, Philip	Horsham
1844		Williams, Walter	Hereford
1853		Williams, Robert	Liverpool
1842		Williams, William	Nottingham
1842		Williams, David	Pwllheli
1853		Williams, John	Leamington
1853		Williams, Edwin	Manchester
1844		Williamson, James	Hunslet
1853		Willmott, Charles	Brighton
1855	171	Wills, Thomas D	Barnstaple
1853		Wilshaw, James	Wordsley
1844		Wilson, Joseph	Canterbury
1841		Wilson, Charles Thomas	Swansea
1842		Wilson, Thomas	Bradford
1853		Wilson, John	Harrogate
1854		Wilson, William	York
1853		Wilson, Edward	Sheffield
1855	303	Wilson, Joseph	Penrith
1841		Wine, John	Bristol
1842		Wing, Thomas N.	Melton Mowbray
1856	254	Wingate, Stephen	Gloucester
1847		Withers, Richard	Blackwater
1842		Witherington, Thomas	Worcester
1853		Withey, William Henry	Stroud
1853		Wood, Anthony	Arnold
1852	111	Wood, Edward	Brighton
1853		Wood, Benjamin	Halifax
1853		Wood, John Edward	Harlow
1842		Wood, William Webb	Pontypool
1842		Wood, Edwin	Abersychan
1846		Wood, Henry	Brentford
1853		Woodcock, Page D	Lincoln
1842		Woods, William	Worcester
1853		Woodward, Charles	Ryde
1853		Woodward, William	Langport
1853		Woodward, William	Nottingham
1842		Wooldridge, Thomas	Windsor
1844		Woolley, Daniel	Stockport
1854		Woolrich, Thomas	Stone
1850		Wootton, William	Wolverhampton
1856	255	Wortley, John	Durham
1842		Wreaks, Thomas Peacock	Glossop
1842		Wreaks, George D	Sheffield
1846		Wright, George Warren	Macclesfield
1842		Wright, Charles	Manchester

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1844		Wright, John James	Sheffield
1853		Wright, James	Chesterfield
1853		Wright, Joseph	Ardwick
1853		Wright, William	Liverpool
1853		Wyatt, Samuel	Tottenham
1845		Wylde, John	Manchester
1845		Wylde, James	Manchester
1841		Wyley, John	Coventry
1852	153	Young, James R.	Edinburgh
1844		Young, John	Sunderland
1853		Young, Tonkin	St. Ives
1853	224	Youngman, Edward	Bury St. Edmunds
1855	345	*Youngman, Robert	Cambridge

ASSOCIATES

ADMITTED BEFORE THE 1st OF JULY, 1842.

NAME.	RESIDENCE.	NAME.	RESIDENCE.
Baigent, William H.	London	Mackey, John B.	London
Baker, Garrad...	Chelmsford	Middleton, Francis	London
Bannick, George Stokes.	London	Morgan, William B.	London
Barber, William Jas.	London	Mornement, Henry J.	London
Baylis, Thomas	Worcester	Peat, William H.	Ryde
Beaton, John William	London	Radford, William	Devonport
Bell, William	Carlisle	Risbrock, Henry	London
Blyth, George Lindsey	Brighton	Roberts, William	Bolton
Bowman, William	London	Ryder, William Henry.	Birmingham
Brewster, Godfrey W.	Cambridge	Sawyer, Henry	Ramsgate
Buss, Thomas	London	Scholefield, Henry	London
Chadwick, Henry	London	Scott, Thomas	Coleshill
Charity, William	Alford	Selleck, Edward	London
Cowl, William	Durham	Steele, John W.	London
Crispe, James	London	Sylvester, Paul	Birmingham
Croucher, William	Shadwell	Taylor, George	London
Dallas, John	London	Thompson, Morley	London
Dew, Joseph Jennings.	London	Tilburn, Robert J.	Sheffield
Dobson, John	Newcastle	Townsend, Charles	London
Dunn, Edward	London	Turner, George	Honiton
Ellwood, William	Carlisle	Walker, Henry	London
Handsley, Taylor	London	Walker, William	Malmsbury
Hindsley, Henry	London	Warren, William A.	Malmsbury
Holt, Isaac	Manchester	Webb, John W.	Gloucester
Howden, Robert	London	Were, Ellis	London
Jenner, W. M.	Sandgate	Williams, Walter C.	Brentwood
Lee, James	London	Wood, John	London
Mackay, John	Worcester	Wright, George H.	London

ASSOCIATES OF THE SOCIETY

WHO HAVE PASSED THE MAJOR EXAMINATION.

Year of Admission	No. of Certificate.	NAME.	RESIDENCE.
1849	76	Alexander, William	Peckham
1857	477	Andrew, Leyshon	Swansea
1855	457	Atherton, John H.	Liverpool
1851	419	Atkins, Ernest R.	Woolwich
1856	484	Banner, Samuel	Liverpool
1846	424	Barker, Matthew Mark	York
1854	374	Barnsby, Robert David	Tours
1846	504	Barrs, John Adcock	Grantham
1853	256	Barry, Thomas	Aberavon
1847	243	Bates, James	Burslem
1848	402	Beach, James	Bridport
1853	346	Bennett, Robert	Lincoln
1855	496	Berger, Volcy	Clapham
1853	322	Bishop, Alfred	Ludlow
1852	208	Blackburn, Francis	Ramsgate
1856	449	Bloye, Henry	Holt
1853	499	Booth, Henry	Rochdale
1851	332	Borland, John	Kilmarnock
1857	495	Boucher, John	Belper
1853	209	Boyce, George	Chertsey
1855	428	Brevitt, William Yates	Birmingham
1849	385	Brown, Allan M'Laren	Brighton
1853	444	Calvert, John	Durham
1853	376	Chapple, Edwin	Bideford
1854	380	Christopher, James	Crickhowell
1857	487	Chrispin, William	Sand Hutton
1853	200	Clarke, William R.	Leighton
1853	281	Cleave, Charles T.	Chudleigh
1842	42	Copeland, John	Woolwich
1846	91	Copney, William	London
1854	466	Cornelius, James	Clapham
1855	469	Cornell, William	Ipswich
1856	480	Cortis, Edward Charles	Worthing
1848	367	Cotton, John L.	Barnstaple
1853	395	Cracknell, Benjamin	Halesworth
1855	432	Cross, William	Bristol
1850	470	Cutting, James	Stowmarket
1851	351	Daines, Thomas	London
1848	377	Davies, William G.	Shrewsbury
1853	282	Davis, Richard H.	Kendal
1853	500	Dunn, James	Durham
1851	352	Dyson, William B.	Wakefield
1853	324	Edman, Bonner	Lincoln

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1846	493	Essery, William	Plymouth
1853	368	Evans, William H.	Haverfordwest
1852	462	Eyre, Joshua J.	Manchester
1856	464	Featherston, John P.	London
1853	336	Fisher, William F.	London
1851	445	Ford, Charles	Reading
1855	421	Fouracre, Robert	Salisbury
1853	283	Freeman, William	Devizes
1850	92	Fyfe, John L.	Brighton
1850	403	Gibbons, George	Clifton
1856	471	Gill, Hugh	Selby
1857	458	Glass, John T.	Ryde, I.W.
1856	446	Green, John	Oundle
1856	438	Groves, Henry	Weymouth
1856	434	Halliday, William Jabez	Pontefract
1849	404	Hopwood, Thomas S.	Richmond
1856	448	Houghton, William	Warrington
1852	494	Humphreys, Richard	London
1857	497	Icke, Henry Scott	London
1856	476	Iverach, John G.	Kirkwall
1853	472	Johnson, Joseph	London
1848	382	Jones, Hugh Lloyd	Chester
1853	340	Jones, William Withers	Welchpool
1856	489	Jones, Peter Cooke	London
1850	465	Jones, Humphrey	Chester
1853	473	Judd, William	Brighton
1852	418	Kemp, David Skinner	Edinburgh
1853	325	Kendall, Charles F.	Scarborough
1853	307	Kiddle, William L.	Bath
1848	299	Kirkman, George B.	Clapham
1853	287	Lawrence, William P.	Macclesfield
1844	183	Lea, Charles Wheeley	Cheltenham
1857	478	Lee, John William	Liverpool
1856	300	Linford, John	Canterbury
1852	236	Logan, Richard	Edinburgh
1854	388	Lomas, Joseph W.	London
1853	330	M'Intyre, Peter S.	Warkworth
1856	451	Marks, Nelson S.	Cardiff
1853	247	Matterson, Edward H.	York
1842	392	Mercer, Nathan	Liverpool
1858	507	Mercer, Nicholas	Liverpool
1857	485	Michell, Frederic	St. Austell
1853	216	Morgan, William	Richmond
1853	217	Mousell, Thomas	Birmingham
1857	482	Oliver, John Hamer	Salop
1853	354	Parrott, John S.	Birmingham
1853	501	Parsons, Francis H.	Southam
1852	430	Payne, John	Leighton
1847	425	Peel, James	Canterbury
1853	413	Penton, Charles W.	Maidstone
1853	301	Picnot, Charles	Rochester
1845	289	Place, William Thomas	Knaresborough
1850	414	Player, Jacob H.	Bedford
1853	422	Preston, Richard	London

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1854	384	Prosser, Evan T.	Cardiff
1848	397	Radermacher, Charles J.	Glastonbury
1853	408	Rayner, William	Canterbury
1850	108	Reeve, Edward	London
1856	439	Reynolds, Arthur	Watton
1855	440	Richards, Charles	Weymouth
1855	459	Richardson, John G. F.	Longton
1849	393	Robbins, John	Launceston
1857	483	Roberts, Peter	Mold
1848	250	Rolfe, William A.	Wokingham
1855	461	Rowell, Charles Frederick	Uppingham
1850	415	Rowson, Henry	Chester
1853	463	Sarsfield, William	Durham
1856	452	Scholefield, Arthur	Basingstoke
1853	316	Scott, Thomas	Birmingham
1853	188	Sidley, Thomas Insall	Edinburgh
1853	277	Sirett, George B.	Buckingham
1852	207	Skrimshire, Thomas	London
1848	441	Smeeton, George H.	Leeds
1849	454	Smeeton, William	Ironbridge
1853	356	Smith, Joseph	Birmingham
1853	349	Smith, Richard	Reigate
1857	475	Smith, William	Glasgow
1842	46	Starkie, Richard S.	London
1853	509	Steevens, Joseph G.	Guildford
1847	33	Swann, William H.	London
1855	409	Taplin, Frederick	Bristol
1853	221	Taylor, John N.	Lincoln
1853	315	Thompson, William A.	Carlisle
1853	502	Thompson, John Robert	Thirsk
1853	320	Thompson, Henry	Leatherhead
1856	498	Tiplady, Frederick	York
1853	222	Turner, Charles E.	Leominster
1856	427	Tyler, Henry Wing	Leicester
1853	266	Walmsley, Samuel	Wem
1853	253	Ward, Philip D.	Halifax
1853	456	West, Robert G.	Liverpool
1856	455	Weston, Charles	Lincoln
1857	503	Wheldon, Henry William	London
1851	114	Whitfield, Henry	Worcester
1853	423	Willett, Edmund	Brixton
1855	442	Williams, David Martin	Truro
1853	399	Williams, John Thomson	Carmarthen
1854	359	Willmott, William	Bristol
1852	152	Wilson, James	Edinburgh
1848	172	Witt, Henry Matthew	Chelsea
1853	360	Woodcock, Joseph	Leicester
1855	443	Yates, Francis	London

ASSOCIATES OF THE SOCIETY

WHO HAVE PASSED THE MINOR EXAMINATION.

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1853	441	Allingham, George Samuel	London
1852	161	Applegate, Edwin	Bradford
1856	424	Arnold, Spencer	Maidstone
1858	503	Ashton, John	Belper
1850	352	Attfield, John	Walworth
1850	393	Baxter, George	Chester
1857	491	Bearcroft, Richard James	Cheltenham
1856	437	Bell, William M.	Stonehouse
1857	520	Blackman, Thomas	Woolwich
1856	433	Bolton, Horatio Nelson	Boston
1855	434	Bond, Charles Radcliffe	Ware
1852	435	Britten, Thomas John	Leominster
1855	461	Brown, John	London
1852	178	Buchanan, James	Edinburgh
1852	179	Cameron, William	Edinburgh
1851	365	Church, Henry J	London
1857	494	Clark, John	Grantham
1854	344	Clingan, William M.	Edinburgh
1852	205	Cobb, John Vinset	Deal
1857	474	Cocking, Samuel	Howden
1848	226	Coles, Ferdinand	London
1853	457	Cutting, Thomas John	Selby
1852	443	Dakin, John	Chester
1855	487	Davis, Richard	Walworth
1857	517	Dunhill, William Workman	Doncaster
1856	488	Ereaut, John	Jersey
1856	418	Farr, Archer	Lambeth
1855	478	Fletcher, John	Camberwell
1857	492	Fowler, Charles Henry	London
1858	505	Francis, Thomas Harper	Dulwich
1853	511	Gill, Levi John	Bridport
1855	405	Goddard, George	Lowestoft
1857	495	Goldfinch, George	London
1856	512	Green, James	Bath
1854	385	Griffiths, Alfred W	London
1856	455	Grimwood, William	Ipswich
1853	341	Grundy, Thomas	London
1853	472	Hallaway, John	Carlisle
1855	404	Harden, Charles	Bristol
1857	471	Harrow, Henry	Tunbridge Wells
1857	493	Hawkes, James	Birmingham
1857	496	Hunneman, Charles Julius	Hanover
1847	56	Huskisson, William J	London
1852	184	Jamie, Robert	Edinburgh
1854	479	Jefferson, Thomas	Cambridge
1845	406	Johnson, Benjamin M	Collumpton
1855	380	Jolley, Horace	London
1853	338	Keeling, Thomas G.	Howden
1854	345	Leighton, Thomas	Edinburgh
1853	264	Lewis, Charles W.	London
1855	399	Lloyd, David L.	Caernarvon

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1846	359	Longstaff, Thomas	Sunderland
1855	475	Madgwick, William Butler	Alresford
1847	148	Matthews, William	London
1857	476	Mee, George	London
1849	91	Miller, Thomas L.	Blandford
1848	221	Murray, William S.	Berwick
1858	506	Muskett, Edwin Burrell	Holt
1858	502	Nesbit, John	Berwick
1855	507	Nicholson, Frederick	London
1852	519	Nicholson, John Joseph	Sunderland
1852	521	Nock, Thomas Francis	Newcastle-und.-Lyne
1855	391	Nooten, Ernest Van	Edinburgh
1851	450	Nosworthy, Robert	Exeter
1853	292	Ostler, Charles	Galashiels
1856	522	Owles, Edward John	Southampton
1852	436	Paine, Standen	Brighton
1858	523	Partridge, William	Dudley
1856	452	Pearson, Edward Smith	Liverpool
1856	524	Rees, Thomas George	Pembroke Dock
1853	294	Rhind, William W.	Berwick
1853	498	Richards, Thomas Lewis	Chester
1856	430	Roberts, Owen	Pwllheli
1857	460	Robinson, John	Woolwich
1853	514	Robinson, William P.	Liverpool
1855	388	Routledge, Henry	London
1857	481	Scott, Joseph Robinson	Sheffield
1857	508	Seymour, George	Oldbury
1853	321	Simpson, Thomas	Walsall
1858	509	Slack, John Lawrence	Ormskirk
1853	268	Speechley, George	Peterborough
1852	413	Stedman, James	Lower Tooting
1853	364	Stewart, Charles J.	London
1856	423	Stewart, James	Kirkaldy
1853	281	Stoneham, Philip	London
1853	396	Symes, Henry T.	London
1855	383	Taplin, George	Bath
1850	326	Tasker, William	London
1854	346	Thomson, John	Edinburgh
1857	473	Tieftrunk, Julius	London
1853	333	Todd, Thomas	Edinburgh
1851	144	Towl, Edward	London
1855	466	Tuck, John	Trowbridge
1853	525	Tucker, Henry	Henley-on-Thames
1854	510	Twinberrow, John	London
1849	125	Warner, John	London
1853	298	Watson, James	Montrose
1858	526	Watson, David	Belper
1851	415	Watton, Edward	Manchester
1857	500	Wigg, Henry John	Lynn
1856	432	Williams, Thomas	Carmarthen
1849	94	Willmott, Edwin	London
1857	501	Woolley, George Stephen	Manchester

REGISTERED APPRENTICES.

Date of Registration.	NAME.	RESIDING WITH.	TOWN.
1857	Alderson, Frederick H.	Mr. Hempsted	St. Leonards
1857	Allan, William	Mr. Carruthers	Dumfries
1857	Allison, Richard R.	Mr. Howorth	Doncaster
1858	Allott, Frederic	Mr. Greaves	Bakewell
1853	Ambrose, John D. L.	Mr. Farmer	Putney
1855	Andrews, Enos	Mr. Cropper	Long Sutton
1851	Anthony, John L.	Mr. Anthony	Bedford
1857	Appleton, Robert	Mr. Wilson	Sheffield
1857	Argles, Robert	Mr. Deane	Clapham
1853	Aston, George G.	Mr. Grindley	Chester
1845	Aston, Thomas	Mr. Fowke	Stafford
1853	Atkinson, George J.	Mr. Wilson	Harrogate
1858	Atkinson, John P.	Messrs. Hurst & Morton	Louth
1856	Atkinson, Edward F.	Mr. Kirton	Hull
1848	Atton, John T.	Mr. Millns	Spalding
1852	Averill, John	Mr. Fowke	Stafford
1858	Badcock, Henry	Mr. Peat	Lymington
1857	Bagshaw, James	Mr. Handley	Wakefield
1857	Baker, Thomas	Messrs. Groves & Son.	Blandford
1853	Barber, Tom.	Mr. King	Rochester
1854	Barber, William	Mr. Nunn	Bury St. Edmunds
1857	Barlow, John Podmore.	Mr. Barlow	Manchester
1854	Barnes, Edwin	Mr. Morton	Durham
1851	Bartlett, Ebenezer	Mr. Mather	Reading
1856	Barton, Frederick	Mr. Wilson	Bradford
1855	Batchelor, George H. W.	Mr. Watts	Chatham
1856	Bate, Henry	Mr. Davies	Chester
1853	Beach, Thomas C.	Mr. Beach	Bridport
1854	Beach, Wesley	Mr. Beach	Bridport
1855	Beach, Tom Clarke	Messrs. Lea & Co.	Great Malvern
1847	Beadell, Alfred	Mr. Gilpin	Newcastle
1855	Beaton, Walter	Mr. Beaton	London
1853	Beddard, John	Mr. Cross	Shrewsbury
1853	Bell, John	Mr. Sowerby	Carlisle
1857	Bell, James Alfred	Mr. Noakes	Brighton
1857	Bell, William	Mr. Cuthbert	Bedford
1853	Bennett, George	Mr. Groves	Blandford
1855	Bennington, William	Mr. Mortimer	Sidmouth
1855	Bentley, William J.	Mr. Pryer	Axminster
1854	Bingley, Frederick B.	Mr. Tanner	Exeter
1855	Birch, Henry C.	Mr. Clarke	Richmond
1854	Bird, David L.	Mr. Wilson	Canterbury
1854	Bishop, William	Mr. Gay	Stroud
1845	Blaxall, Arthur S.	Mr. Blanchflower	Loddon
1853	Blenkin, Peter S.	Mr. Lofthouse	Hull
1858	Blundell, Joseph A.	Mr. Groves	Weymouth
1850	Blyth, William J.	Mr. Hurworth	York
1856	Bourdas, Isaiah	Mr. Bourdas	London
1856	Bowler, Harvey F.	Mr. Hitchcock	Colchester
1854	Bradley, Edwin S.	Mr. Parker	Derby
1858	Bradley, John Perry	Mr. Parker	Birmingham

Date of Registration.	NAME.	RESIDING WITH.	TOWN.
1856	Brayshay, Thomas	Mr. Brayshay	Stockton
1857	Brereton, Matthew B.	Mr. Mabson	Yarmouth
1856	Brew, John	Mr. Brew	Brighton
1854	Brice, William W.	Mr. Rook	Sittingbourne
1853	Briggs, James A.	Mr. Briggs	Tipton
1856	Brock, George Walter	Mr. Fairbank	Woolwich
1856	Brooks, Saml. Brewer	Mr. Lawton	Wakefield
1853	Brown, Charles B.	Mr. Thorne	Bedford
1855	Brown, William H.	Mr. Corder	North Shields
1856	Brown, John	Mr. Forge	Driffield
1857	Brown, Edward	Mr. Dutton	Birkenhead
1856	Browne, John Edwin	Mr. Bartlett	Chelsea
1853	Burdock, James	Mr. Reading	Warwick
1856	Burt, James	Mr. Allanson	Harrogate
1854	Burton, Joseph	Mr. Wick	Sheffield
1856	Burton, John	Mr. Parker	Derby
1858	Butler, Edward D. B.	Mr. Penney	Poole
1853	Buzzard, Thomas Hardy	Mr. Rainey	Spilsby
1857	Campbell, Robert	Mr. Mackay	Galashiels
1857	Carre, Louis C. A.	Mr. Tylee	Bath
1855	Carrington, Ebenezer T.	Mr. Toone	Warminster
1855	Cartner, David	Mr. Bell	Carlisle
1854	Chambers, William	Mr. Dresser	York
1855	Chapman, Francis C.	Mr. Green	Droitwich
1853	Chater, Edward M.	Mr. Chater	Watford
1851	Clarke, William	Mr. Parker	Birmingham
1855	Clarke, Willoughby	Mr. Brown	Oxford
1856	Clarke, Caudell	Mr. Searby	Norwich
1858	Clarkson, Sidney	Mr. Macarthy	Romford
1853	Cocking, Thomas	Mr. Wood	Holbeach
1858	Colby, John	Mr. Colby	Brighton
1857	Cole, Alfred	Mr. Groves	Hammersmith
1853	Cook, William	Mr. Gamble	Grantham
1855	Cooper, Frederick	Mr. Cooper	Leicester
1853	Cornish, Thomas R.	Mr. Cornish	Penzance
1856	Cornish, William	Mr. Cornish	Brighton
1854	Coulson, Henry	Mr. Coulson	Scarborough
1855	Coulthard, Christopher	Mr. Harrison	Carlisle
1858	Coward, John Senior	Mr. Butler	Pontefract
1854	Cozens, William	Mr. May	Reading
1854	Crease, James	Mr. Mackay	Edinburgh
1852	Crossby, Joseph P.	Mr. Greaves	Bakewell
1853	Crussell, James W.	Mr. Cooper	London
1849	Cumpsty, George C.	Mr. Warburton	Bolton
1856	Dallas, Clement	Mr. Gay	Woodbridge
1854	Dalrymple, William	Mr. Luff	Oxford
1858	Davenport, John M.	Mr. Davenport	London
1857	Davies, Robert John	Mr. Roberts	London
1858	Davies, William	Mr. Coleman	Cardiff
1856	Davison, William	Mr. Greaves	Bakewell
1855	Dawson, John	Mr. Goddard	Yarmouth
1855	Dean, Samuel	Mr. Fox	London
1852	Deighton, Thomas M.	Messrs. Lea & Co.	Worcester

Date of Registration.	NAME.	RESIDING WITH.	TOWN.
1853	Dickins, Benjamin	Mr. Kendall	Stratford-on-Avon
1858	Dodshon, Edward	Mr. Dodshon	Sunderland
1857	Doughty, Edward T.	Mr. Doughty	London
1853	Dowsett, Arthur	Mr. Baker	Chelmsford
1856	Draper, Henry Foulger	Mr. Arnold	Norwich
1858	Dumolo, John Thomas	Mr. Parker	Birmingham
1852	Duncan, John M.	Mr. Lavers	Lewisham
1853	Earland, William	Mr. Davies	Hay
1856	Eason, John	Mr. Gilkes	Leominster
1858	Eastman, Jabez	Mr. Clark	Hackney
1853	Eddowes, Ralph	Mr. Fowke	Stafford
1857	Edwards, Frederick H.	Mr. Medcalf	Lower Tooting
1854	Eland, Edward F.	Mr. Telfer	Oxford
1853	Elliott, Robert	Mr. Steward	Yarmouth
1849	Else, William	Mr. Jones	Derby
1856	Eminson, John	Mr. Marshall	Gainsborough
1853	Evans, William	Mr. Ferris	Bristol
1857	Evans, Alfred Paget	Mr. Cutting	Leamington
1857	Eve, Charles	Mr. Wilson	Holloway
1854	Fairley, Robert	Mr. Mackay	Edinburgh
1856	Farrar, William	Mr. Heming	Sunderland
1853	Fenoulhet, James H.	Mr. Hewett	Yarmouth
1854	Fidel, Albert J.	Mr. Telfer	Oxford
1853	Fielder, Henry Thomas	Mr. Fielder	Warminster
1856	Fleetwood, Thomas	Mr. Kendall	Stratford-on-Avon
1845	Flood, William W.	Mr. Goodman	Exeter
1857	Foggitt, Thomas	Mr. Smeeton	Leeds
1854	Foster, Thomas U.	Mr. Weston	Sleaford
1851	Fowler, Robert J.	Mr. Harvey	Leeds
1856	Fox, Edward M.	Mr. Michell	Falmouth
1853	Fresson, William	Mr. Fresson	Stevenage
1846	George, Henry	Mr. Davis	Leominster
1853	Gething, William	Mr. Tomlinson	Lincoln
1857	Gibbs, Thomas	Mr. Steward	Yarmouth
1858	Giddings, Wm. H. C.	Mr. Stocken	London
1851	Gilliatt, William	Mr. Gamble	Grantham
1855	Goodchild, Nathaniel	Mr. Wood	Brighton
1855	Goodwyn, Charles S.	Mr. Chapman	Ipswich
1853	Graham, Ralph	Mr. Fairweather	Newcastle
1858	Greig, Francis	Mr. Mackay	Edinburgh
1851	Green, Robert	Mr. Knott	Exeter
1855	Green, Conrad	Mr. Kendall	Stratford-on-Avon
1855	Gregory, Richard	Mr. Lavers	London
1855	Grigor, William	Mr. Macfarlan	Edinburgh
1851	Grimwade, Edward W.	Mr. Ridley	Ipswich
1853	Gunn, Frederick T.	Mr. Cross	Shrewsbury
1857	Haines, John Jenkins	Mr. Haines	Bromsgrove
1856	Hall, Thomas H.	Mr. Hall	Southampton
1856	Halsey, Bennet	Mr. Husband	Exeter
1854	Ham, Charles	Mr. Foster	Collumpton
1852	Hampson, Thomas	Mr. Woolley	Manchester
1854	Harley, Edward	Mr. Foster	Ludlow
1850	Harpley, Richard B.	Mr. Hodgson	Stockton
1856	Harrison, Stephen	Mr. Breary	Douglas
1858	Hartley, William	Mr. Humphreys	Birmingham

Date of Registration.	NAME.	RESIDING WITH.	TOWN.
1853	Haslam, Frederick B.	Mr. Dakin	Poplar
1858	Hasselby, Thomas J.	Mr. Chantry	Goole
1856	Hatch, Richard	Mr. James	Bognor
1857	Hatchard, Stephen	Mr. Huggins	Alresford
1853	Hayward, Charles	Mr. Tomlinson	Lincoln
1856	Head, John T.	Mr. Head	Lewes
1857	Heald, Alfred John	Mr. Barley	Wisbeach
1850	Heap, Edward	Mr. Wylde	Manchester
1848	Henwood, Nicholas L.	Mr. Geldard	Plymouth
1853	Herbert, Henry	Mr. Groves	Blandford
1857	Highway, Matthew H.	Mr. Caddick	Newcastle-u.-Lyne
1843	Hill, William	Mr. Rowe	Plymouth
1851	Hill, William R.	Mr. Tylee	Bath
1856	Hill, William	Mr. Gardner	Edinburgh
1857	Hill, Francis	Mr. Reinhardt	Leeds
1857	Hoare, James Roper	Mr. Gigner	Chelsea
1852	Hodgkinson, John S.	Mr. Brooker	Macclesfield
1856	Holland, William	Mr. Sibary	Longton
1852	Holliday, Joseph	Mr. Wilding	Liverpool
1857	Holmes, William C.	Mr. Stocken	London
1855	Holmwood, William C.	Mr. Coppock	Bridport
1855	Holt, George F. W.	Mr. Obbinson	Sleaford
1856	Holt, William Henry	Mr. Paulden	Altrincham
1854	Horn, William	Mr. Longrigg	Appleby
1853	Huggins, Richard	Mr. Tanner	Exeter
1856	Hughes, Evan	Mr. Deane	Clapham
1854	Humphries, Henry A.	Mr. Grounds	Ludlow
1852	Hunter, George	Mr. Garbutt	Gateshead
1853	Hustwick, Thomas H.	Mr. Coupland	Harrogate
1857	Iliffe, Frank	Mr. Brown	Coventry
1843	Ince, Joseph	Mr. Ince	London
1856	Jackson, Warwick	Mr. Hitchcock	Colchester
1856	Jackson, John	Messrs. Wilson & Co.	Bradford
1853	Jacob, John R.	Mr. Bowers	Chester
1855	Jakins, George S.	Mr. Golding	London
1853	James, Robert	Mr. Fletcher	Nottingham
1853	Jones, Charles W.	Mr. Jones	Carmarthen
1853	Jones, Richard L.	Mr. Jones	Narberth
1857	Jones, David Hodges	Mr. Brend	Swansea
1855	Keene, John	Mr. Savage	Brighton
1856	Kemp, Francis	Mr. Smeeton	Leeds
1851	Kent, William H.	Mr. Buck	Colchester
1856	Kent, Frederick W.	Mr. Randall	Southampton
1854	Knight, John A.	Mr. Arnold	Norwich
1858	Knowles, John Hiles	Mr. Anthony	Bedford
1857	Lacey, Walter	Mr. Meredith	Bristol
1855	Lamplough, John	Mr. Stevenson	Derby
1857	Langley, William	Mr. Tylee	Bath
1857	Lavers, Thomas F.	Mr. Lavers	Lewisham
1853	Lawrence, George	Mr. Wright	London
1856	Lawrence, Henry	Mr. Watkins	Stratford
1851	Lees, James	Mr. Clarke	Richmond
1853	Le Feuvre, Francis	Mr. Ereaut	Jersey
1853	Long, Alfred	Mr. Noakes	Brighton

Date of Registration	NAME.	RESIDING WITH.	TOWN.
1857	Lovatt, John Hammond.	Mr. Wilshaw	Wordsley
1858	MacGeorge, William	Mr. Carruthers	Dumfries
1857	Machon, Edward	Mr. Parkes	Manchester
1855	Malin, Edmund C. M.	Mr. Huggins	Barnet
1850	Manthorp, George	Mr. Manthorp	Colchester
1847	Marrack, George M.	Mr. Searle	Crediton
1852	Marrack, Philip	Mr. Searle	Crediton
1853	Marston, Alfred	Mr. Cocking	Ludlow
1856	Martin, James	Mr. Palk	Southampton
1857	Martin, Benjamin	Mr. Handley	Wakefield
1857	Mason, John	Mr. Mason	Hastings
1857	Mathias, Thomas	Mr. Jones	Narberth
1853	Matthews, Charles	Mr. Gostling	Diss
1858	Maudson, Joseph W.	Mr. Maunder	Sheffield
1855	May, Augustus S.	Mr. Greenwell	London
1855	McCabe, Dunbar	Mr. Macfarlan	Edinburgh
1857	Midgley, John James	Mr. Reinhardt	Hull
1856	Miller, Duncan S.	Mr. Pooley	Bath
1856	Mohun, Martin	Messrs. Argles & Co.	Maidstone
1856	Monger, Hamilton S.	Mr. Gay	Stroud
1857	Moore, Abraham	Mr. White	Birmingham
1856	Morley, Edward	Mr. Asling	Spalding
1856	Morley, George	Mr. Wheeler	Hackney
1853	Moverley, Robert	Mr. Dingley	Maidstone
1857	Murrell, John Friday	Mr. Maynard	Brandon
1856	Newby, John	Mr. Hughes	Altrincham
1855	Norrish, James	Mr. Searle	Crediton
1858	Olliver, George E.	Mr. Groves	Weymouth
1847	Orpe, Thomas M.	Mr. Watton	Derby
1857	Orton, Thomas J.	Mr. Iliffe	Nuneaton
1849	Ough, William	Mr. Jeffery	Devonport
1856	Overton, William	Mr. Fowke	Stafford
1847	Owen, Thomas R.	Mr. Mease	North Shields
1852	Owles, James	Mr. Owles	Yarmouth
1852	Pain, Walter E.	Mr. Pain	Cambridge
1852	Pattison, Henry	Mr Hooper	Brighton
1855	Paxton, William M.	Mr. Mitchell	London
1853	Peacock, Hamerton	Mr. Peacock	London
1853	Pearce, Henry T.	Mr. Pearce	Gloucester
1858	Pearcey, Herbert A.	Mr. Biggs	London
1857	Pearson, George B.	Mr. Kay	Leeds
1853	Phillips, John Dutton	Mr. Dennison	Dudley
1858	Phillips, Jonathan	Mr. Christian	Godalming
1858	Pissey, William F.	Mr. Pissey	Rayleigh
1857	Pistrucci, Filippo	Mr. King	London
1855	Pitman, John	Mr. Fendick	Bristol
1855	Potts, Robert A.	Mr. Potts	London
1854	Power, Thomas M.	Mr. Williams	Nottingham
1854	Pratt, James	Mr. Nunn	Bury St. Edmunds
1858	Pratt, Henry	Mr. Loggin	Stratford-on-Avon
1857	Price, Thomas	Mr. Laen	Pembroke Dock
1857	Pritchard, George F.	Mr. Barnes	Knightsbridge
1857	Prust, Richard	Mr. Brend	Swansea
1848	Pullan, John R.	Mr. Gascoigne	Harrogate

Date of Registration.	NAME.	RESIDING WITH.	TOWN.
1858	Pullin, William H.	Mr. Parkes	Atherstone
1853	Quinlan, Joseph	Mr. Times	London
1853	Radermacher, George	Mr. Bartlett	Chelsea
1855	Rae, John Inglis	Mr. Mackay	Edinburgh
1858	Rainnie, Alexander	Mr. Stewart	Edinburgh
1858	Rayner, Gilmour G.	Mr. Brend	Swansea
1853	Rawling, John W.	Mr. Oldham	Wisbeach
1856	Rea, James Parker	Mr. Rea	London
1857	Reed, Alfred	Mr. Gordelier	Sittingbourne
1854	Reeves, Robert	Mr. Gordelier	Sittingbourne
1857	Renaud, Monchery	Mr. Deane	Clapham
1856	Reynolds, Freshfield	Mr. Martin	Guildford
1851	Ridley, Albert	Mr. Grimwade	Ipswich
1852	Riley, James	Mr. Smith	Sutton Coldfield
1852	Rivers, Henry	Mr. Hornsby	Odiham
1853	Roberts, Albinus J.	Mr. Williams	Horsham
1856	Roberts, John L.	Mr. Sibary	Longton
1857	Robinson, James F.	Messrs. Picton & Hatton	Warrington
1858	Romans, Thomas	Mr. Cutting	Selby
1856	Rosselloty, John C.	Mr. Couch	Islington
1850	Roulston, Benjamin W.	Mr. Chantry	Goole
1857	Rowell, Joseph	Messrs. Sturton & Son	Peterborough
1853	Rubbra, Frank	Mr. Hope	Wellingborough
1853	Salmon, Henry L.	Mr. Moore	Brighton
1855	Sanger, William A.	Mr. Maitland	London
1857	Savage, Wallace	Mr. Savage	Brighton
1846	Savory, Thomas H.	Mr. Savory	London
1846	Savory, Charles H.	Mr. Savory	London
1854	Saxby, Henry	Mr. Saxby	Lewes
1853	Say, Edmund H.	Mr. Cooke	Norwich
1855	Scarlin, James H.	Mr. Marchant	Ipswich
1857	Scott, James Furness	Mr. Smith	Dunstable
1857	Seaton, Charles A.	Mr. Hill	Sherborne
1855	Shaw, Ward	Mr. Lofthouse	Hull
1845	Shepheard, Thomas	Mr. Gulliver	Lutterworth
1854	Shepley, Samuel	Mr. Claughton	Chesterfield
1857	Sheriff, Thomas	Mr. Macfarlan	Edinburgh
1855	Simpson, Thomas	Mr. Allen	Boston
1852	Sinclair, George	Mr. Gilpin	Newcastle
1854	Slater, Henry	Mr. Asling	Spalding
1856	Slator, Thomas	Mr. Pilley	Boston
1856	Smart, Benjamin	Messrs. Lea and Co.	Worcester
1852	Smith, Edward	Mr. Lynch	Manchester
1852	Smith, William	Mr. Sumner	Birmingham
1853	Smith, Frank de Carle	Mr. Wright	London
1854	Smith, Frederick	Mr. Foster	Ludlow
1844	Smith, James W.	Mr. Coulson	Scarborough
1858	Soole, Seymour Henry	Mr. Jessopp	Bishop Stortford
1858	Southall, Joseph S.	Mr. Harvey	Leeds
1855	Spearing, James	Mr. Dowman	Southampton
1858	Stanley, Robert Swan	Mr. Wortley	Durham
1854	Stanway, William H.	Mr. Blandford	London
1857	Stapleton, Thos. Glode	Mr. Collins	London
1853	Stevens, H. W.	Mr. Hitchcock	Colchester

Date of Registration.	NAME.	RESIDING WITH.	TOWN.
1856	Stokes, Edward H.	Messrs. Lea and Co.	Malvern
1857	Stone, George	Mr. Tonge	York
1858	Stretton, Charles	Mr. Parker	Derby
1853	Sturges, William T.	Mr. Gudgen	Kimbolton
1855	Sturton, John R.	Mr. Sturton	Peterborough
1857	Swinnerton, William	Mr. Woods	Worcester
1857	Syer, John Witham	Mr. King	Soham
1857	Symes, Charles	Mr. Ellis	Thornbury
1856	Tanner, Augustus F.	Mr. Dickinson	London
1853	Taylor, Samuel	Mr. Tonge	York
1857	Taylor, George Spratt	Mr. Coupland	Harrogate
1853	Teasdale, Thomas	Mr. Myers	Newcastle
1855	Teed, David	Mr. Pasmore	Exeter
1854	Thomas, George S.	Mr. Outhwaite	Bradford
1856	Thomson, Denzil	Mr. Witherington	Worcester
1858	Tilden, William A.	Mr. Allchin	London
1858	Tolbert, Thos. W. H.	Mr. Froud	Dorchester
1853	Tollinton, Richard B.	Mr. Jackson	Stowmarket
1857	Touzeau, James Fred.	Mr. Arnold	Guernsey
1857	Touzeau, John Arnold	Mr. Arnold	Guernsey
1856	Towerzey, Alfred G.	Mr. Towerzey	London
1857	Trewavas, Richard J.	Mr. Job	Truro
1856	Trotter, Joseph	Mr. Brown	York
1857	Truman, George F.	Mr. Wellington	Oakham
1853	Turner, John	Mr. Payne	Aylesbury
1856	Twinberrow, James K.	Mr. Twinberrow	London
1855	Underdown, Fred. W.	Mr. Hall	Canterbury
1855	Videon, Charles	Mr. Whitmore	London
1855	Vooght, William	Mr. Twinberrow	London
1850	Wadsley, George	Mr. Mills	Bourne
1846	Wakefield, Cecil H.		Worcester
1849	Walker, Charles	Mr. Walker	Hogsthorpe
1854	Walker, Joseph	Mr. Witherington	Worcester
1857	Walker, George	Mr. Goodall	Derby
1857	Wall, John Thomas	Mr. Butcher	Cheltenham
1853	Walls, Thomas	Mr. Barber	Liverpool
1856	Walsh, Edward	Mr. Argles	Maidstone
1852	Walters, William	Mr. Tanner	Exeter
1855	Walton, Ralph	Mr. Ritson	Sunderland
1846	Warner, George T.		Nottingham
1857	Warren, Thomas P. B.	Mr. Pasmore	Exeter
1858	Waters, Alexander	Mr. Corrie	Bedford
1852	Watson, James B.	Mr. Fitt	Barking
1853	Watson, William	Mr. Chapman	Ipswich
1857	Watson, Richard T.	Mr. Dobinson	Bishop Wearmouth
1857	Watson, Thomas D.	Messrs. Martindale & Son	Carlisle
1857	Watts, John Newton	Mr. Watts	London
1856	Waugh, Alexander	Mr. Randall	Southampton
1857	Webber, Charles F.	Mr. Edwards	Sidmouth
1858	Weller, James W.	Dr. Somerville	Bloxwich
1850	Wells, Edwin	Mr. Grounds	Ludlow
1853	Wheeler, James	Mr. Payne	Aylesbury
1855	Wheeler, Joseph	Mr. Owen	London
1856	White, John G.	Mr. Ransome	Hitchin
1856	White, James W.	Mr. Iverach	Kirkwall

Date of Registration.	NAME.	RESIDING WITH.	TOWN.
1856	Whitehouse, George H...	Mr. Tonge	York
1857	Wigginton, Joseph	Mr. White	Nottingham
1858	Willan, James R.....	Mr. Pratt	Wolverhampton
1850	Willcox, John	Mr. Hollier	Dudley
1856	Willsher, Stephen Henry.	Mr. Bolton	Tenterden
1852	Wilson, William	Mr. Rainey	Spilsby
1853	Wiltshire, Alfred	Mr. Pearce	Gloucester
1856	Witherington, Henry ...	Mr. Witherington ...	Worcester
1853	Wood, Edmund	Mr. Pooley	Bath
1854	Wood, John Robert.....	Mr. Simmonds	Boston
1857	Wood, Albert	Mr. Watkins.....	Walsall
1855	Yerworth, Edmund.....	Mr. Binge	Pimlico
1853	Young, John.....	Mr. Anderson.....	Musselburgh
1853	Young, Ralph	Mr. Gilpin	Newcastle
1857	Young, John.....	Mr. Mackay	Galashiels

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THE FATE OF THE SALE OF POISONS BILL, WITH SOME ACCOUNT OF THE CIRCUMSTANCES WHICH LED TO THIS RESULT.

The defeat of the Sale of Poisons Bill will doubtless be attributed to the Pharmaceutical Society, and not without some reason. If the Council had not been watching its progress, so as to give the alarm to the Members at the proper time, the Bill might have been passed, like the Medical Bill, with but a hasty and superficial consideration of its merits and probable consequences. In justice to the Society, however, it should be generally known that the opposition to the Bill was not factious, or undertaken with a view of obstructing legislation. On the contrary, the following brief narrative of the proceedings will clearly show, that not only was great forbearance exercised, but the most persevering efforts were used, and assistance offered by the Society in vain, with a view of amending the Bill, before any steps were taken for throwing it out.

So desirous were the Council to avert by anticipation any probable difficulty or obstacle that might impede the smooth progress of the measure, that even before the Bill appeared, application was made to Lord Derby for a copy of certain recommendations of a deputation of Physicians and others (referred to at the anniversary of the Society on the 19th of May), in the hope that, on a reconsideration of the subject, the introduction of the provisions likely to give rise to opposition might have been prevented. The request was not granted, and the information which had been received on the subject, not having been official, could not be acted upon. The fears of the Council were realized, and the Bill made its appearance containing the provisions referred to, and which have, as was anticipated, proved to be the chief sources of difficulty and opposition.

Immediately on the appearance of the Bill, several communications took place with the Hon. Col. Talbot, Lord Derby's secretary, whose uniform courtesy and attention claim our grateful acknowledgment; and the following letter was addressed to his Lordship:—

15, *Langham Place, June* 7, 1858.

My Lord,—I regret the necessity of troubling your Lordship on the subject of the Sale of Poisons Bill, but I think it better at this early stage to point out any provisions that appear to be objectionable, instead of deferring it to a later period. The provision to which I chiefly refer is the proposal to supersede the Pharmaceutical Society, by the appointment of a new Board of Examiners, to examine candidates for the distinction of "Licenced Druggist." For about eighteen years the Pharmaceutical Society has been endeavouring to introduce a regular education and examination of all Chemists and Druggists. During nearly the whole of this time, very little encouragement has been obtained from the Legislature or the Government; the efforts of the Society having been met either with indifference or opposition, and the necessity for education and examination having been scarcely admitted to exist. It is now generally acknowledged that some qualification in those who dispense medicines including poisons is necessary for the safety of the public, and it is also acknowledged that the Pharmaceutical Society has done service to the public in promoting this object, for which its establishment is expressly designed. Yet in carrying the principle into practice, it is now proposed to appoint another Board of Examiners, the tendency of which would be to divert candidates from the channel of education and examination provided by the Society, substituting a qualification which must of necessity be inferior to that of a

Pharmaceutical Chemist, and frustrating the endeavours of the Society to raise the standard of education. The distinction between a Pharmaceutical Chemist and a Licenced Druggist would scarcely be recognized by the public; and as the examination for a Licenced Druggist would be attended with the smallest amount of trouble and expense, the Pharmaceutical Society would be superseded. I have seen the President of the College of Physicians, and some other influential members of the College, who, I have reason to believe, are favourable to the views of the Pharmaceutical Society on this subject. I therefore most respectfully and earnestly request that the further progress of the Bill may be deferred until an opportunity has been afforded for a conference with the representatives of the College of Physicians and of the Pharmaceutical Society. I may also observe that the opinion which was received by your Lordship as that of the Royal College of Physicians, was in fact the opinion of a deputation consisting of Physicians and others. I should be able, if favoured with an interview, to explain more fully the facts of the case, and also to point out other objections to the constitution of the proposed Board of Examiners.

I have the honour to remain, my Lord,
Your Lordship's obedient Servant,

To the Rt. Hon. the Earl of Derby. Jacob Bell.

The following reply was received the same day:—

Downing Street, 7th June, 1858.

Sir,—I am directed by Lord Derby to acknowledge the receipt of your letter of this day's date, relative to the Sale of Poisons Bill, and to acquaint you that the Bill in question is to be committed *pro formâ* to night, to allow of amendments being printed. His Lordship will send you a copy, but he cannot admit the validity of your objections to the proposed Board of Examiners.

I have the honour to be, Sir,
Your most obedient Servant,

Jacob Bell, Esq. Maurice Drummond.

This was immediately acknowledged as follows:—

15, *Langham Place, June 7th*, 1858.

My Lord,—I have the honour to acknowledge the receipt of your Lordship's favour of this day. I regret that your Lordship does not admit the validity of the objections to the proposed Board of Examiners, as upon that question the Pharmaceutical Society will stand or fall. I am obliged to leave town on business for three days, on my return I look forward to receiving a copy of the Bill as amended.

I have the honour to be, &c. &c.,

To the Rt. Hon. the Earl of Derby. Jacob Bell.

After some further communications, Lord Derby appointed Monday, the 14th of June, for an interview, at 3 P.M.

The Poison Committee met on the morning of that day, again fully considered all the provisions of the Bill, and reduced the proposed amendments to a definite form.

In consequence of the indisposition of Lord Derby, the interview did not take place. The Bill was referred to Lord Malmesbury, who, on a personal application, put off its further progress for a week. During the interval, communications took place with several members of the House of Lords, who, upon hearing an explanation of the case, and the grounds of objection to the Bill, admitted that the several questions at issue deserved and required reconsideration. The practical inconvenience and inutility of the registration of the sales of oxalic acid and some other poisons was pointed out, as well as the impossibility of keeping parliamentary poisons separate from other poisons. The other objectionable provisions, and the severity of the penal clauses, were also fully discussed.

Communications took place with the President and other official representatives of the College of Physicians, with a view of obtaining the sanction of the College to the amendments proposed by the Society; which being satisfactory, the result was communicated to the Earl of Derby.

The week of grace drawing to a close and the Earl of Derby being still confined to his house, various inquiries were made to ascertain who had charge of the Bill; and on the 23rd of June it was suggested that some information might be obtained from Mr. Walpole, who, however, declined to enter upon the subject, as the Bill had not yet come officially before him. After numerous applications through various channels, the following letter was received:—

F. O., June 25.

Sir,—Lord Malmesbury has directed me to reply to your letter of yesterday's date on the subject of the Sale of Poisons Bill. Lord Hardwicke has taken charge of this Bill, and I am to refer you to his Lordship to make any communications you may wish respecting it. Lord Malmesbury has written to Lord Hardwicke to say that you will call upon him.

I am, Sir, your obedient Servant,

Jacob Bell, Esq. John Bidwell.

The progress of the Bill was further adjourned until the 5th of July, before which date Lord Hardwicke, having patiently investigated the subject in all its details, acknowledged the necessity of some very material amendments to meet the objections urged by the Pharmaceutical Society.

On the 5th of July, Lord Derby, for the first time since his Lordship's illness, resumed his seat in the House; and upon being informed by Lord Hardwicke as to the nature of the amendments desired, declined to adopt any of them, and took the Bill again into his own hands. The substance of the discussion which occurred in the House of Lords on that occasion is reported (page 143).

Under the circumstances above detailed, it was deemed necessary to make another effort to obtain access to the Earl of Derby, as follows:—

15, *Langham Place, July* 6, 1858.

My Lord,—I regret the necessity of troubling your Lordship again on the subject of the Sale of Poisons Bill, but I am acting on behalf of a large number of correspondents in all parts of the country, who are anxiously waiting to learn the result of the efforts of the Pharmaceutical Society to procure the removal of the objectionable provisions of the Bill. I have had the honour of communicating personally with Lord Hardwicke and several other Members of the House of Lords, who, upon hearing an explanation of the facts of the case, are sensible of the validity of the objections to the proposed Board of Examiners, as well as some other provisions in the Bill. It is impossible in a written communication to state the case so clearly as I could in an interview of a few minutes, and I can scarcely expect your Lordship to read the article on the subject in the *Pharmaceutical Journal* which I take the liberty of enclosing, but having laboured with my colleagues for many years in the endeavour to promote the public safety by improving the qualifications of dispensers of medicine, I should very much regret the passing of a Bill which instead of assisting, would retard, and, in some degree, frustrate these efforts. I therefore once more respectfully request the favour of an opportunity of verbally explaining the grounds of opposition to the Bill in its present form.

I have the honour, &c. &c.,

To the Rt. Hon. the Earl of Derby. Jacob Bell.

On the same day (July 6th) a letter was received from Lord Talbot de Malahide, stating that his lordship was requested by the Earl of Derby to communicate with the representatives of the Pharmaceutical Society, and proposing an appointment for that purpose, which took place in the course of the evening. Every detail of the subject was minutely discussed, and some trifling amendments, to which Lord Derby had assented, were mentioned. On behalf of the Society, it was distinctly stated that on two questions no compromise could be entertained—first, with reference to the appointment of a new Board of Examiners; secondly, with regard to the interference with vested rights by requiring Chemists already in business to pass an examination. The impracticability of some of the provisions of the Bill were pointed out, and the amendments suggested by the Committee were handed to his Lordship in writing. As a Meeting of the Council was summoned for the following morning, it

was arranged that the sense of the Council should be taken on the subject, and the result reported without delay.

At the Meeting of Council, July 7th, the following resolution was passed:—

Resolved,—"That having heard the President's statement regarding his interviews with Lord Talbot de Malahide and other noble Lords on the subject of the Sale of Poisons Bill, the Council express their entire and unanimous concurrence with the views presented by him, and their determination to support him, especially in the opposition to the appointment of a separate Board of Examiners."

On the following day, being the date fixed for the third reading of the Bill, a last appeal was made to the Earl of Derby, as follows:—

15, *Langham Place, July* 8, 1858.

My Lord,—Lord Talbot de Malahide, to whom I was referred on the subject of the Sale of Poisons Bill, having left town, I am obliged once more to appeal to your Lordship. I had a long conversation with Lord Talbot de Malahide, the result of which was, I believe, that his Lordship saw the force of most of the objections urged by the Pharmaceutical Society against the Bill. This I have found to be the case with every one who has taken the trouble to become conversant with the *facts*. As the Council of the Pharmaceutical Society met yesterday, and again fully discussed the subject, I called at Lord Talbot's residence, as arranged, to report the result. His Lordship having been suddenly obliged to leave town, I have the honour to enclose a copy of the resolution of the Council. I have with the Pharmaceutical Society used every endeavour to promote the passing of the Bill in a form in which it would be likely to work well; but I despair of placing the facts of the case clearly and intelligibly before your Lordship, unless I could be favoured with an interview. If a good and efficient "*Sale of Poisons Bill*" should not pass, no blame can be attached to the Pharmaceutical Society, whose exertions have been constant and indefatigable for more than seventeen years, in the endeavour to promote that object. I have the honour, &c. &c.,

To the Rt. Hon. the Earl of Derby. Jacob Bell.

The letter was delivered personally at his Lordship's residence, and on calling for an answer at the time suggested by the servant, a verbal reply was received through that official in these words:—"His Lordship can't see you now, and named no time when he could see you."

The request having been thus refused, several members of the Poison Committee hastily met and arranged to attend at the House of Lords on that afternoon to hear the fate of the Bill. A reporter was retained with instructions to furnish a verbatim report of the debate on the subject. Several noble Lords went down to the House prepared to support the amendments which had been discussed on the previous occasion. While the parties interested in the question were waiting for the debate to commence, the words "read a third time," and "Bill do pass," pronounced at the table, were indistinctly heard. A noble Lord said, "That was the Poison Bill which passed," another said, "No, it has not come on yet," but upon inquiry at the table it was ascertained that the Poison Bill had actually passed, *sub silentio*, and without any amendments except those introduced by Lord Derby. The members of the Committee were as much astonished as a countryman on the Derby Day, who having kept his eye, as he thought, fixed on the pea, finds on lifting the thimble that it is gone!

On passing through Whitehall, the Committee met Col. Talbot, Lord Derby's secretary, who naturally inquired, "What have you done about the Poison Bill?" "Nothing at all; Lord Derby has thrown us over, and passed the Bill without a word of our amendments, in fact, with some additions which make it rather worse." "And what do you intend to do now?" "There is nothing to be done now but to throw it out in the Commons. We are very sorry, but it is not our fault."

It is worthy of remark, that up to this moment, six o'clock, P.M., July 8th, not a breath of opposition had been heard against the Bill out of doors. The

Bill had been circulated for nearly a month throughout the country; it had been reprinted in the *Pharmaceutical Journal* with copious remarks exposing its defects; an extensive correspondence was going on, and every post brought fresh inquiries with offers of assistance in case opposition should be necessary, but the reply that negotiations were in progress with the House of Lords with a prospect of obtaining the requisite amendment of the Bill, was satisfactory to the Members, and also to Chemists and Druggists generally, who waited patiently for the result, having confidence in the vigilance of the Council.

Within two hours of the third reading in the House of Lords, circulars were in the printer's hands convening a meeting of the Members to be held on Monday, the 12th instant, at the House of the Society, of which the report will be found at page 116. Circulars were also prepared informing the local secretaries of the failure of the efforts of the Council, with a short statement describing the provisions of the Bill as passed, and suggestions for opposing it in the House of Commons in the usual way. Within twenty-four hours the symptoms of a coming storm were manifest. Petitions began to come in, Members received earnest letters from their constituents, and in the course of two or three days the entire House of Commons was sensibly influenced by the pressure. The Home Secretary was besieged in all directions, and became irresistibly convinced of the necessity of some important amendments in the Bill.

Deputations from the country, and Members of the Council in London, clustered in the lobby of the House to meet their representatives, and to convey their sentiments directly or indirectly to Mr. Walpole, who invited them to form a deputation and attend at the Home Office to discuss the question. The offer was cheerfully accepted, for, while the prospect of amending the Bill at that late period of the session, especially after what had taken place, seemed almost a forlorn hope, it was considered of the highest importance that no opportunity should be lost of assisting the Government, if possible, in reducing the Bill to an unobjectionable form. It was the opinion of some experienced Members of Parliament that the petitioners were in the power of the Government, who had been carrying everything before them with a high hand, and even passing with scarcely a division measures against which a formidable opposition had been threatened. Under any circumstances it was considered a favourable symptom, that the justice of the claims of the petitioners to be heard was courteously recognized and an audience so readily granted. The time fixed was Saturday the 19th, at twelve o'clock, but on the previous day a communication was received from the Home Office, changing the hour to five, P.M. Such, however, was the pressure of the opposition, that Mr. Walpole, in the course of Friday evening, stated in the House that communications had been sent to him from every quarter, almost from every village, stating that the Chemists had serious objections to the Sale of Poisons Bill, and although he did not quite agree in all of them, yet as he thought the Bill required great amendment, he proposed not to proceed with it this session. The Bill was accordingly withdrawn.

The deputation nevertheless attended at the time appointed; when Mr. Walpole sent for the Chairman, and said that, as the Bill was withdrawn it was useless to trouble the deputation to attend. He was informed that the deputation, some of whom had come from a distance, were in the adjoining room, and were desirous of explaining their views on the subject of the Bill; as they believed that by expunging the objectionable provisions, a Bill might be drawn which would be practically useful and satisfactory. Mr. Walpole said at this late period of the session it was useless to attempt to amend the Bill, and that in the face of such an opposition it would be utterly impossible to carry any Bill whatever.

Although it would have been more satisfactory to have obtained a judicious law, providing for the due qualification of vendors of poisons, the labour bestowed on the Sale of Poisons Bill has not been thrown away. The result will serve to convince the Members of the Pharmaceutical Society of the

importance of perseverance in the course they have steadily pursued for many years, and which, by raising their professional status, at the same time increases their moral influence. It will also prove to Chemists and Druggists generally, that their interests are identified with the Pharmaceutical Society, which was established for the general improvement and benefit of all; and while the privileges of membership are of course confined to those who join the Society according to the terms of the Charter and Bye-laws, its influence in reference to any proposed legislation will always be exerted to oppose unjust or unconstitutional interference with the vested rights of Chemists, whether Members or not. We may also hope, after what has occurred, that on future occasions, if any Bills should be introduced into Parliament having reference to Pharmacy and the sale of poisons, the advice and assistance of practical men, having experience in the business, will not be disregarded.

THE PASSING OF THE MEDICAL BILL.

To the surprise of many persons, the Medical Bill has passed both Houses of Parliament. Various opinions are in circulation respecting its probable influence on the character and well-being of the profession. Considering the complication of interests affected by such a measure, it was not to be expected that the result would give universal satisfaction; the only source of surprise is the fact, that at last a Bill has been framed which has not shared the fate of every previous Medical Bill during more than a quarter of a century.

The first merit which is observable on comparing this Bill with its predecessors, is, that it does not commence with a general repeal of almost every Act relating to the medical profession since the date of Henry VIII., thus reducing the profession to a state of chaos. The object of the Bill as stated in the preamble, is to enable persons requiring medical aid to distinguish qualified from unqualified practitioners. For this purpose, a "General Council of Medical Education and Registration of the United Kingdom" is to be established, and branch Councils for England, Scotland, and Ireland, respectively. The General Council is to consist of eighteen members, of whom one is to be nominated by each of the medical corporations (enumerated in schedule A) in England, Scotland, and Ireland, and six by her Majesty with the advice of her Privy Council, also a President, to be elected by the General Council. All medical practitioners are to be registered in a form prescribed in schedule D, according to their respective qualifications. Registrars and other officers are to be appointed, and the registers are to be kept in correct order by the erasure of the names of practitioners deceased, and the addition of the names of all who enter the profession. Such additions may be made on the application of the individuals or on the production of evidence from the College or body in schedule A, a fee being paid in either case not exceeding two pounds for each practitioner so registered.

The General Council is authorised to take measures for procuring the revocation of the power to confer the right of registration in the case of any of the bodies in schedule A whose course of study and examination shall appear to the said Council to be not such as to secure the requisite amount of qualification. The register is to be published annually, on the 1st of January, under the title of "The Medical Register." Every person registered under the Act is to be entitled to recover charges for professional services, &c. Provided always, that it shall be lawful for any College of Physicians to pass a bye-law to the effect that no one of their Fellows or Members shall be entitled to sue in any court of law for such charges. The Colleges of Physicians have a peculiar antipathy to the privilege of suing their patients, this being an ancient distinction between a professional man and a tradesman.

No person not registered under the Act is to be empowered to hold certain offices, no medical certificate is to be valid unless the person signing it is registered, and the words legally qualified medical practitioner shall mean a

person registered under this Act. Suitable penalties are provided for the fraudulent assumption of titles and other false pretences.

The College of Physicians of London is empowered to obtain a new Charter, subject to certain conditions, among which is that of admitting any Fellow, Member, or Licentiate of the Edinburgh and Dublin Colleges of Physicians respectively, who is practising in England, on payment of a registration fee of two pounds, as a Member of the said College of Physicians of England. The College of Surgeons is empowered to adopt measures for instituting an examination for dentists. Sect. 51 is as follows :—"The General Council shall cause to be published under their direction a book containing a list of medicines and compounds, and the manner of preparing them, together with the true weights and measures by which they are to be prepared, and containing such other matter and things relating thereto as the General Council shall think fit, to be called 'British Pharmacopœia,' and the General Council shall cause to be altered, amended, and republished, such Pharmacopœia as often as they shall deem it necessary."

52. "Nothing in this Act shall extend, or be construed to extend, to prejudice or in any way to affect the lawful occupation, trade, or business of Chemists and Druggists, and Dentists, or the rights, privileges, or employment of duly licenced Apothecaries in Ireland, so far as the same extend to selling, compounding, or dispensing, medicines."

It is needless here to enumerate the provisions respecting the meetings of the General Council and Branch Councils, the filling-up of vacancies, the removal from the register of the names of unworthy practitioners, the remuneration of officers, and the payment of expenses under the Act, with other matters of detail. The general aim of the Act is to ensure uniformity of qualification in the United Kingdom, so that, for example, the degree of M.D. obtained in any University in England shall represent the same amount and quality of education which would be implied by the same degree conferred by a University in Scotland or Ireland. With this view, the General Council is to have jurisdiction over all the Colleges and bodies granting degrees, with power to regulate the course of study, and to attend or depute persons to attend any of the examinations. While the Colleges of Physicians occupy a prominent position among the bodies in schedule A, represented in the General Council, it is optional with graduates in medicine whether they join either of the said Colleges or not, and unless some arrangement be made by the Colleges themselves, offering an inducement to Graduates to become Fellows or Members, these bodies, which ought in each branch of the kingdom to represent the entire medical department, will subside into local corporations, rivalling the universities, instead of forming a bond of union for the graduates of all.

During the progress of the Bill in Parliament, Mr. Headlam undertook to move certain amendments in committee in which he was not successful; and, although some amendments were introduced, the Bill passed in a form not altogether satisfactory to the College of Physicians. It was, however, deemed expedient not to carry the opposition any further, for though, by a vigorous effort, the Bill might possibly have been thrown out, it was not unlikely that it might in that case be followed by one even more objectionable next year; and it is, we believe, generally admitted that the present Bill, although not satisfactory to all parties, is less open to objection than any of the Medical Bills previously introduced.

On going into committee on this Bill in the House of Lords,

The Earl of CARNARVON explained that its object was to simplify and amend the present complicated arrangements under which the medical profession was governed. It was not a destructive Bill; it kept alive all the old corporations at present existing in this country, and it endeavoured to put fresh life and spirit into them. It continued to them the access to the profession, and instituted complete reciprocity between them. It also established one central medical council, which would have a general regulating power, subject to an appeal, however, to the Privy

Council. The Bill also made provision for a system of registration, and, on the whole, he thought its operation would be found productive of great benefit to the profession at large.

Lord Ebury said it was a doctors' Bill, and they were about to entrust medical practice entirely to a set of men who declared they had no faith in their system. Dr. Bailey, on his death-bed, doubted whether the medicine which he had prescribed had not done more harm than good. Dr. Chambers, in a funeral oration upon Dr. Williams, said the deceased had no confidence in medicine; and Dr. Forbes stated that the present practice of medicine was so entirely unsatisfactory, that he hoped some new school might be set on foot.

Their Lordships then went into committee on the Bill.

Clauses 1 to 35 were agreed to, with amendments.

On clause 36, which enacts that any person who shall wilfully and falsely pretend to be, or take or use the name or title of a physician, surgeon, general practitioner, &c., shall pay a sum not exceeding £20, or less than £5.

Lord Ebury moved to omit the words, "or take or use the name or title of." The noble Lord said if he divided alone he would go into the lobby against this clause.

Lord Redesdale said that by the new rule two tellers were to be appointed for divisions, and as the noble Lord appeared to stand alone, he did not see how he could divide.

The clause was then agreed to, and the Bill, as amended, went through committee.

The above short extract from the discussion in the House of Lords will serve to show the estimation in which medical science is held by some of the aristocracy, who claim the privilege of placing their faith in homœopathy, hydropathy, Coffinism, or any "new light" that may from time to time illumine the simple-minded. It was on behalf of these amateur modes of practice that the following proviso was introduced into the section relating to the erasure of the names of members from the register:—"Provided always, that the name of no person shall be erased from the register on the ground of his having adopted any theory of medicine or surgery."

THE PURIFICATION OF THE THAMES.

The Chancellor of the Exchequer has cut the Gordian Knot. The problem to be solved had exhausted the skill, ingenuity, and experience of practical men: engineers, architects, surveyors, builders, iron-founders, and deodorisers were at fault. Thousands of pounds had been expended in experiments and competitions, surveys, parliamentary committees, and reports, and one scheme after another had been abandoned as chimerical, absurd, or impracticable. The odour of the Thames was strong in the nostrils of Parliament, and the weary session had only a few days to run, when the Chancellor of the Exchequer, by a master-stroke of long-headed and far-seeing policy, extricated the Government from a most perplexing and difficult responsibility, by throwing it on the Board of Works.

As stated in the *Times* of July 17th—

"The whole soil and ground of London, in the largest sense of that word, including more than a hundred square miles and several chains of hills, are to be given up to Mr. Thwaites and what is modestly called the "Board." There is not a street or a house, a church, a theatre, a railway, a hill or a vale, under which he may not drive a sewer. Freehold property is said to be from the centre of the earth to the sky, but between us and the centre the "Metropolitan navvy" may now pick away as much as he pleases, and leave us in a state of pleasing suspense."

The sum of three millions sterling is to be placed at the disposal of the Board, whose taxing powers for the collection of the amount are to be spread over forty years. It is computed that the work will occupy about five years and a half, but whether this estimate be correct, and whether the sum of three millions be the first instalment merely, or the sum total of the expense, time alone will show.

The policy of this arrangement on the part of the Government is twofold. First, it is a mode of escape from a very awkward dilemma; secondly, it is an opportunity of paying a tribute to the popular theory of local self-government. If the scheme should fail, the blame will rest on Mr. Thwaites and the Board; if it should be successful, the Chancellor of the Exchequer will enjoy the credit of putting the right man in the right place. In the mean time the suspense as to the result, and the popularity of the tribute to parochial wisdom, will tend to increase the temporary buoyancy the Government has already acquired by the introduction of other measures, indicating elasticity of principle in the direction of the wishes of the million.

If we compare this mode of dealing with a difficult question with the course pursued in reference to Pharmacy and the sale of poisons, the contrast is remarkable. The Board of Works, comprising men of various trades and professions, elected with reference to their general habits of business in parochial affairs, but having no special skill or practical experience in drainage and engineering, has taken up a theory with regard to the purification of the Thames and the drainage of the metropolis. Some persons speak favourably of this theory or scheme, while others have an opposite opinion, which would undoubtedly be the case with any theory, however plausible, until submitted to the test of experience. Taking an indulgent view of the case, the undertaking is a speculation, and the responsible parties are about to embark in a business to which they have not served an apprenticeship, and for which they require the modest sum of three millions to enable them to start.

The Pharmaceutical Society is not a theory or a speculation. Its labours during more than seventeen years have been devoted to the task of providing the public with a qualified class of Chemists, to whom might safely be entrusted the dispensing of medicines and the sale of poisons. The Society has had no assistance, or even sympathy from the Legislature; but the success and efficiency of its proceedings have been proved before a Committee in the House of Commons in 1852, in the House of Lords last year, and, in fact, have not been and are not called in question. The Society seeks to be entrusted with the responsibility of regulating the qualifications of Pharmaceutical Chemists and the vendors of poisons. It asks for no money or assistance, its Members being practical men experienced in the business, and having an establishment with all the machinery requisite for conducting the affairs of the Society, which is sanctioned by Act of Parliament, and its Bye-laws under the control of the Secretary of State. The Government which entrusts a newly constituted Board with irresponsible powers and three millions sterling to carry out the Thames speculation, rejects the offer of the Pharmaceutical Society after seventeen years of practical experience, to perform the duties for which it was established, and for which it has been proved to be competent, and brings in a Bill which would supersede and destroy the Society, substituting an inexperienced and irresponsible Board of three Examiners. It also proposes a vexatious and degrading interference with the business arrangements of the Members of the Society, subjecting them to a most ignominious and arbitrary system of penalties, not for culpable negligence merely, but for any deviation, however slight, from absurd amateur regulations respecting the colour of pots and bottles, the style of labels, the separation of Parliamentary poisons from other poisons, and the form of entry of every sale of certain poisons, whether by the pennyworth or upwards. Such is the punishment proposed by a considerate Government for those who have laboured for many years in the service of the public, with the express object of guarding against the dangers sought to be met by the Sale of Poisons Bill, and who, if they had received the encouragement which might reasonably have been expected from the Legislature, would have rendered a Sale of Poisons Bill altogether unnecessary.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

BOTANICAL PRIZE FOR 1859.
A SILVER COUNCIL MEDAL

Is offered for the best Herbarium, collected in any part of the United Kingdom, between the first day of August, 1858, and the first day of August, 1859; and should there be more than one collection possessing such an amount of merit as to entitle the collectors to reward, a second prize, consisting of a Bronze Medal, and also Certificates of Merit, will be given at the discretion of the Council. In the event of none of the collections possessing such an amount of merit as to warrant the Council in awarding Medals or Certificates, none will be given.

The collections to consist of Phanerogamous plants and Ferns, arranged according to the Natural System of De Candolle, or any other natural method in common use, and to be accompanied by lists, arranged according to the same method, with the species numbered.

The collector to follow some work on British Botany (such as that of Babington, or Hooker and Arnott), and to state the work which he adopts. The name of each plant, its habitat, and the date of collection, to be stated on the paper on which it is preserved.

Each collection to be accompanied by a note, containing a declaration, signed by the collector, to the following effect:—The plants which accompany this note were collected by myself between the first day of August, 1858, and the first day of August, 1859, and were named and arranged without any assistance but that derived from books.

In estimating the merits of the collections, not only will the number of species be taken into account, but also their rarity or otherwise, and the manner in which they are preserved, and should a specimen be wrongly named, this will at once be erased from the list.

The collections to be forwarded to the Secretary of the Society, 17, Bloomsbury Square, on or before the first day of August, 1859, endorsed, "Herbarium for Competition for the Botanical Prizes."

If required, the collection will be returned after competition, with the exception of that of the successful competitor for the Silver Medal, which will be added to the Herbarium of the Society.

No candidate will be allowed to compete unless he be an Associate, Registered Apprentice, or Student of the Society, or if his age exceed twenty-one years.

AT A MEETING OF THE COUNCIL, *7th July*, 1858,

Present—Messrs. Bell, Bird, Deane, Hanbury, Macfarlan, Meggeson, Peacock, Sandford, Squire, Standring, and Waugh, the following were elected

MEMBERS.

BLANDFORD .....Glyde, John William
CARDIFF .....Cross, William
MAURITIUS .....Baschet, Pierre Edmond
" .....Boullé, Janvier Alfred
" .....Minet, Alphonse Edouard
WOLVERHAMPTON .....Brevitt, William Yates
YORK.....Bowman, William

MAJOR EXAMINATION, *20th July.*

Ashton, John .....Belper
Francis, Thomas Harper .....Dulwich
Mee, George.....Woolwich
Nicholson, John Joseph.....Sunderland
Stewart, Charles John .....London
Tucker, Henry .....Henley-on-Thames
Twinberrow, John .....London
Watson, David .....Belper

MINOR EXAMINATION.

Chater, Edward M. ..... Watford
Dallas, Clement ..... Woodbridge
Ingall, Joseph ..... Wath-upon-Dearne
Medwin, Aaron George ..... Greenwich
Williams, Thomas Kemble ..... Welchpool

REGISTERED APPRENTICES.

NAMES.	RESIDING WITH	ADDRESS.
Denne, Henry	Mr. Kingdon	Notting Hill
Wyman, John	Mr. Gulliver	Lutterworth

AT A SPECIAL MEETING OF THE COUNCIL, 12*th July*, 1858,

Convened for the purpose of considering the steps to be taken in opposition to the Sale of Poisons Bill in the House of Commons,

Present—Messrs. Bell, Bird, Bottle, Brew, Bucklee, Davenport, Hanbury, Hollier, Macfarlan, Meggeson, Peacock, Squire, and Waugh,

The following Petition was adopted and signed by the Members present, and the Secretary was instructed to obtain the signatures of the absent Members of Council:—

TO THE HONOURABLE THE COMMONS OF GREAT BRITAIN AND IRELAND IN PARLIAMENT ASSEMBLED:

The Petition of the Council of the Pharmaceutical Society of Great Britain,

Humbly showeth,

That the Pharmaceutical Society was established for the purpose of advancing Pharmacy and providing the public with a qualified class of Dispensers of Medicine, to whom the custody and sale of poisons might safely be entrusted; that it was incorporated by Royal Charter in the year of our Lord 1843, and the Charter was confirmed by the Pharmacy Act, the 15th and 16th Vict., cap. 56, 1852.

That admission to the Society can only be obtained by passing an examination, the preparation for which requires a complete course of study, and that the status conferred by Membership, and indicated by the title of Pharmaceutical Chemist, is the only inducement for acquiring this qualification.

That the appointment of a distinct Board of Examiners, as proposed in the Sale of Poisons Bill, and the granting of Certificates of Qualification on payment of a nominal fee, and without the necessity of undergoing any specified course of study beyond that indicated in the Schedule, would induce young men to spare themselves the trouble and expense of becoming Pharmaceutical Chemists —thus tending to substitute a nominal for a *real and substantial* qualification.

That the Board of Examiners appointed under the 15th and 16th Vict., cap. 56, is fully competent to perform all the duties of examination contemplated in the Sale of Poisons Bill; but that if any further guarantee of its efficiency be required, your Petitioners would propose the addition to the Board of a Fellow of the College of Physicians, appointed by the Secretary of State.

That this arrangement would greatly promote the public welfare and safety, by enabling the Society to continue successfully its efforts in promoting efficient education, while the institution of the proposed Board would frustrate these efforts by introducing and perpetuating an inferior class of Chemists and Druggists.

That the only provision of a Sale of Poisons Bill to which your Petitioners attach importance, is that which enforces a proper qualification in all persons dealing in poisons.

That the proposed regulations for the Registration of Sales would rather increase than diminish the risk of accident, by inducing purchasers to obtain larger quantities than they require, to spare themselves a frequent repetition of the annoyance; that the separation of the drugs, &c., designated as poisons in

the Bill, from others equally poisonous, would create a delusive sense of security with reference to the latter substances, and thus increase the danger.

That the provision in the 11th section requiring persons already in business to undergo an examination, is unprecedented and unconstitutional.

That the entry and searching of shops by the Examiners, or any person appointed by them, is invidious and objectionable.

That the proposed penalties are unjust and excessive.

Your petitioners therefore humbly pray that your Honourable House will refuse assent to the Sale of Poisons Bill in its present form.

SALE OF POISONS BILL.

A SPECIAL MEETING of the MEMBERS of the Pharmaceutical Society was held on Monday, the 12th ult., at the House of the Society, to consider the steps to be taken relative to the progress of the Sale of Poisons Bill; Mr. JACOB BELL, President, in the chair. There was an unusually large attendance, including Members from Edinburgh, Leamington, Barnstaple, Dover, Dudley, Brighton, Cambridge, Ashford, Kingston, Maidstone, Oxford, &c.

The PRESIDENT, in commencing the business, said—The Council very much regret the necessity of calling the Members together on this occasion. If you knew all the exertions we have made—the number of meetings the Poison Committee has held—the voluminous correspondence we have undertaken with a view of ascertaining the opinions of the trade throughout the country, and the requirements of the public, and consequently the nature of the enactment that would be best suited to meet the case—if you knew all this, and the difficulties the Council have met with in their endeavours to obtain a modification of the present Sale of Poisons Bill, you would be able to enter into the feelings of regret with which we find it necessary to call you together, and acknowledge that up to the present time we have been unsuccessful in these efforts. When it is considered that the Society was established for the express purpose of obtaining improved legislation in reference to the sale of poisons, by raising the qualifications of those who sell them, and establishing Pharmacy in this country on such a basis as to protect the public from the principal source of danger, namely, the ignorance of the vendors of poison, it is certainly a humiliating and discouraging circumstance to find that after so many years of hard labour in the cause we should be obliged to meet and oppose a Poison Bill introduced by the Legislature. No doubt our opposition to the measure will be misrepresented by some good-natured people. No doubt it will be said that our opposition to the Bill arose from selfish feelings, in not liking to be interfered with, and not caring about those measures of precaution which the public safety requires. It has been said of us before, when we opposed certain impracticable restrictions and regulations, and it may be said again; but I hope you will be able to meet these misrepresentations without feeling annoyed. We know what has been our object and ambition during a long series of years. The question originated with the Society nearly twenty years ago, from a feeling that, whilst this country stood superior to all others in almost everything connected with arts, manufactures, science, and commerce, it was in a disgraceful position with regard to Pharmacy when compared with France, Germany, and every other civilized nation in Europe. Our object was to emancipate this country and ourselves from the disgrace that rested on us as a body: up to this time our exertions have been opposed or disregarded by every successive Government that has been in office for the last seventeen years. It is only recently that a "change has come over the spirit of the dream" of legislators, and they have seen the necessity that those who deal in poisons should be properly educated—which admission is sufficient to make us feel satisfied to bear any temporary misrepresentation that might be heaped upon

us. We must not expect to gain credit in our lifetime for what we are doing for the benefit of the public. We must be aware that any effort in the direction of improvement or reform is usually met with obloquy and persecution; but you may rest assured that some fifty years hence our exertions will receive their due amount of credit. Even Jenner was hunted down and despised during his life: he has been dead about fifty years, and a statue was erected to his memory a few days ago. Why do we object to the Bill now before Parliament? The answer is simply that it has been drawn up by persons unacquainted with the business of a Chemist and Druggist. If I were called upon to draw up an Act of Parliament for regulating the business of a shoemaker, of which I am perfectly ignorant, the first thing I would do would be to place myself in communication with persons in that business, and obtain from them all the information I could on the subject; and if I had not time to do it myself, I would depute others to obtain it and place it before me, in a concise form and in a manner to be relied upon. Unfortunately, that was not precisely the course adopted with reference to this Bill. Lord Derby, in the committee of the House of Lords on the previous Bill, paid some attention to the facts and statements made by us before that committee; he very materially cut down and altered it. His Lordship paid some respect to the communication sent to him through the Home Secretary, and to another communication from the College of Physicians in connexion with other medical practitioners; but having gone so far, and framed his Bill, from that moment all communication with his Lordship was cut off. In consequence of the noble Earl's illness an interview which had been arranged was prevented; the Bill was handed over, first to the Earl of Malmesbury, and then to the Earl of Hardwicke, who, having gone very carefully into the subject, and being thoroughly convinced of the justice of the objections to the Bill, stated these facts to Lord Derby in the House of Lords. On which Lord Derby took the Bill out of his hands, and said he would resume the conduct of it himself. Several other noble Lords—Earl Granville, Lord Talbot de Malahide, Lord Wensleydale, Lord Portman, and others—also investigated the subject, and spoke in favour of the amendments on the report in committee; but Lord Derby would not listen to any of these suggestions on that occasion, and, although he stated they should have his best attention, yet when the Bill passed the third reading it was found not to contain one word of the suggested amendments, but, on the contrary, some additions were introduced which made the Bill rather worse. Under these circumstances, the Council had no alternative but to appeal to the Members at large, and also to the Chemists and Druggists throughout the kingdom, to ascertain if they were willing to submit to such a Bill as this, or whether they would avail themselves of the constitutional mode of protecting their rights, which was afforded to them by the House of Commons, and make known to the Government, through the medium of their representatives, those facts that had been disregarded by the noble Lord who had taken charge of the Bill in the other House. In making these remarks, I wish to give Lord Derby full credit for having no desire to inflict the mischief that this Bill would produce. I believe the noble Lord has no intention or desire to injure the Pharmaceutical Society, or retard the progress of Pharmaceutical education, or impose on the public any regulations or restrictions that would be really inconvenient or unsuited to the purpose in view; but his Lordship is not practically acquainted with the subject on which he has undertaken to legislate, and in consequence he has fallen into the errors of which we have to complain. In the communication we indirectly had with Lord Derby (having been unsuccessful in obtaining a personal interview with him), it was distinctly stated that the Chemists and Druggists and the Society were disposed to consent to some compromise, in order to arrive at a conclusion as nearly satisfactory as possible; but there were certain points on which we could make no compromise whatever. On two points especially the

Council made a stand, and we appeal to you to support us. The first is in reference to the proposed Board of Examiners, and the second with reference to compelling all Chemists and Druggists already in business to go to school again and pass an examination. You all know that the Board of Examiners of the Pharmaceutical Society is acting under an Act of Parliament (although Lord Derby was not aware of the fact, or that the Bye-laws are under the sanction and control of the Home Secretary), and the Board of Examiners has had some experience in the office. It has been suggested that the present Board should continue; the Secretary of State having the power to add a Fellow of the College of Physicians to its number, which ought to satisfy those who object to entrust the Society with uncontrolled power. But what would be the effect of the new Board it is proposed to establish under this Bill? It would be this: the Pharmaceutical Society, although it has an Act of Parliament, is nevertheless a voluntary Society, and the only inducement for Chemists and Druggists to join it is the character and the title which the diploma of the Society gives to its possessors. Consequently, it is through the medium of ambition to obtain that title and that honour, that the public are to be provided with properly qualified dispensers of medicine, inasmuch as persons could not join the Society without qualifying themselves according to the regular routine of education, tested by the Board of Examiners, whose certificate is a guarantee that the possessor may safely be trusted with the sale of poisons. Supposing the Board to be constituted under the Bill, viz. a Physician, an Apothecary, and a Chemist, this Board would have the power of granting licences upon an examination, for which no data have been provided other than may be found in the schedule relating to certain poisons which it designates as such, and consequently we may infer that the Examiners would deal with such substances as are named in the Act and no others; at all events, there is no reason to suppose the examination would be of a nature to compete with that of the Pharmaceutical Society. It would be comparatively superficial and imperfect, and on the payment of a nominal fee every person would be entitled to announce himself to the world as a person duly qualified by the Government Board of Examiners. We all know that young men in selecting a position, if they think they could gain as good a one from the Government for half a guinea as by adopting the more expensive and laborious course of qualifying themselves as students of the Pharmaceutical Society, would prefer the former, and the consequence would be that the schools of the Society in London and elsewhere established for the promotion of the science of Pharmacy, would be deserted. This provision, therefore is unsuited for the purpose for which it was intended. It is intended to furnish to the public a better qualified class of persons to supply medicines and deal in poisons, but so far from its attaining that object, it would tend to retard and frustrate that which the Society has been labouring to maintain, viz. the improvement of Pharmaceutical knowledge, and on that ground the Council will resist the formation of such a Board. It was suggested by Lord Derby, through Lord Talbot de Malahide, that he would have no objection to add two more Members of the Pharmaceutical Society to the Board of Examiners, but this would make the case worse, on the ground that anything that gave to the Board more weight, would more effectually decoy students from the regular course of education. The other ground on which we take a stand, is that with reference to the Chemists and Druggists throughout the kingdom. Officially there is no duty thrown on the Society for the protection of the interests of those who are not Members, but as we are the only body in the country representing Pharmacy, we always make it a rule, and consider it our duty, to pay due respect to the general interests of the trade, and in reference to every Bill that comes under the consideration of the Society, we make it a *sine quâ non* that justice shall be done to those in business, that no law should be retrospective, but that every person in business at the time of any such Bill passing, should be exempt from interference.

But we are asked, is it right the public should be poisoned merely in order that the rights of persons already in business should be preserved and protected? If that be so, whose fault is it? If the Legislature had listened to what the Pharmaceutical Society said fifteen or seventeen years ago, and had done their duty as the Society had endeavoured to do its duty, there would have been no ignorant Chemists and Druggists now in business at this time, but they would all have been educated men. Every attempt made by the Pharmaceutical Society to improve the professional education of the Chemist and Druggist, and to introduce reforms with regard to the safety of the public, I regret to say, has been resisted by the Government up to this time, and now we are told the public are not to be poisoned because Chemists already in business feel aggrieved at this measure. The Chemists and Druggists of this country have complied with the existing laws, and conducted their businesses according to Act of Parliament, and it is not fair to call upon them on the sudden whim and caprice of the Government to go through an examination, or in default to oblige them to give up business, to the ruin of many of them. A man, though not a Pharmaceutical Chemist, might have been in business fourteen and fifteen years, and practically acquainted with his business, and if not, it was the fault of the Legislature, but now, by Lord Derby's Bill, he is to be called up for examination, and if he decline the ordeal or fail to pass, he would be deprived of his position as a Chemist, and his family become great sufferers. It was not so on the passing of the Apothecaries Act in 1815. That Act was passed to prevent ignorant persons from entering the business, but it exempted those who were then in practice, and inflicted no injustice on them. In reforms of the law the practice is also different. When it is proposed to abolish a law court that is an acknowledged public nuisance, care is taken that no injustice shall be inflicted on private individuals. In some such instances, compensation is granted equal to the annual income for the remainder of the parties' lives, and if that principle were applied to Chemists and Druggists, I have no doubt they would willingly consent to the interference Lord Derby proposes. The subject of the registration of the sale of poisons is such a favourite theme with the authors of the Bill, that we can scarcely expect to get it expunged, though the Council has been and is prepared to suggest a compromise in reference to that provision. At the same time the Council have made it known, and I believe it is the general opinion of the Chemists and Druggists throughout the kingdom, that these restrictions would be of little or no value for the safety of the public. It should be remembered that every sale of a pennyworth or twopennyworth of certain poisons entails upon the seller the necessity of entering in a book the name of the purchaser and his witness, together with their address, occupation, and the purpose for which the poison is required, entailing a great amount of labour, occupying considerable time and causing great inconvenience to the tradesman and the purchaser. In order to obviate the objection to that part of the Bill as much as possible, the Council think it desirable to remove to the second part of the schedule certain articles which should be exempted from that ordeal; this would reduce that part of the Bill to a state in which it might be tolerated. The Council do not, however, think that the public would derive much, if any, security from the regulation, which opinion is confirmed and forcibly stated in a letter just received from Mr. John Barry, of the firm of Allen and Co., Plough Court, one of the most experienced members of the trade, who observes:

"Although retired from business, and no longer feeling its personal responsibilities, I am apprehensive that the enactment for regulating the sale of poisons will have the effect of inducing purchasers to buy those poisons in larger quantities at a time. The *purchasers* will become *storekeepers*, and sometimes very negligent ones, as the public know from past experience. Ought not the Legislature to anticipate the consequences of *this* negligence?"

The effect of this regulation would be to compel numbers of persons to buy

oxalic acid, for example, in larger quantities, to diminish the frequency of the annoyance, and when they require a dose of Epsom salts, the oxalic acid would be ready for them to take by mistake. The Bill, under this regulation, sanctions and legalizes the sale of poisons, and relieves Chemists and Druggists from responsibility. I would ask, is there any one present who would sell an ounce of prussic acid to a customer not in the profession? ("No," from all parts of the room.) If this Bill were to pass, any respectable cheesemonger might apply for it, bringing as a witness a grocer known to the vendor, both offering to sign the book, and stating that it was wanted to kill a cat (a lawful purpose). The Chemist in such a case could scarcely refuse it, being applied for in strict conformity with the Act of Parliament; and thus prussic acid, which cannot now be obtained by the public, would be easily procurable in any quantity by almost any applicant. A proper arrangement of poisons, and keeping them in a safe place, is of course desirable, and every well educated Chemist adopts such precautions as his experience suggests. We all know what substances are poisons by the laws of nature, but this Bill proposes to ride rough-shod over the laws of nature, and singles out a few poisons—probably 10 or 15 per cent. of the entire number—and provides that these poisons shall be kept separate from all others. The penalty for placing hellebore or henbane on the same shelf with opium, or lead and baryta on the same shelf with tartar emetic, &c., is, for the first offence £5, second offence £10, third offence not less than £20, and it may be £100. No Act of Parliament can alter the nature of substances known to the profession as poisons, and the selection of a small number to be separated from others and alone recognized as poisons, would create a fallacious notion of security with regard to other poisons not so recognized or subjected to precautions. If this were the only defect in the Bill, however inconvenient and useless it might be, some endeavour might be made to submit to it, but another provision empowers the proposed Board of Examiners, or any persons appointed by any two of them, to enter and search shops with a view of enforcing the Act, which might subject the Chemist to malicious and vexatious proceedings instigated by a rival Apothecary, or any person who might desire to annoy him. A deviation from the letter of the law in regard to a label (whether in capital letters or not), or in reference to the arrangement of his poisons, the sale of a pennyworth without the form of entry in the book, the omission of the word poison on a lotion, or any other matter however trifling in itself, would subject the accused to the heavy penalties just described. If any such visitation of shops be necessary, the authority under which it should be done is that of the President and Censors of the College of Physicians, who already have the power of visiting shops in the city of London. But we naturally resist the interference of the proposed Board of Examiners, especially if any of its members are to be appointed by the Society of Apothecaries. Experience has taught us the necessity of keeping ourselves distinct from the Apothecaries, and in the Pharmacy Act there is a section providing that no member of the medical profession, while in practice as such, can be on the register as a Pharmaceutical Chemist. We are a distinct body, and we wish to avoid the error of our predecessors, the old Apothecaries, who resolved themselves into a medical body, and left Pharmacy. There is therefore a good ground for resisting any interference on the part of the Apothecaries, or any connexion with them. Formerly, hostility and disputes existed between the two bodies; but since the entire separation they have lived on very good terms, and no future disagreement is to be expected, unless the attempt to bring us into collision should be persisted in. The question before us is what are we to do under the circumstances? The Council have tried every means in their power to effect a compromise that would be satisfactory to the trade at large, but have failed; and they have received letters from all parts of the country, offering assistance in resisting the Bill, and have hitherto replied, "Wait—let us try what we can do by quiet negotiation on the part of the Society with Lord Derby and other

noble Lords, and obtain the amendments justice demands; but if that should fail, no time will be lost in informing the trade, with a view to further action." The Council continued its negotiations with reference to the amendments proposed by them, and up to the third reading of the Bill they were sanguine in the hope that some would be adopted; but finding the Bill was passed in all its aggravated form, with further additions, making it rather worse, the Council considered there was no time to be lost, and the Members were immediately invited to meet to consider what had best be done. The Council have prepared a petition for presentation to the House of Commons, signed by themselves, and another has been prepared for the adoption of the meeting, to be signed by the Members of the Society. The Council's petition it is proposed should be forwarded to the Right Hon. Milner Gibson, M.P., for presentation, with a request that he will support its prayer, and the Members' petition it is proposed should be forwarded to the Right Hon. Sir Benjamin Hall, M.P., for presentation, with a similar request. We have been blamed for not having taken more active steps earlier, and I have received some letters to that effect this morning. My answer was, that the Council considered it unnecessary to trouble the Members, believing they were likely to obtain the introduction of such amendments in the Bill as would meet the justice of the case, and it was only when we found that nothing more could be done by negotiation, that we considered ourselves justified in calling upon the Members generally to use their influence in their several localities with their respective representatives for the defeat of the Bill.

Mr. Cotton (Barnstaple) moved the first resolution :—

"That this Meeting having fully considered the provisions of the Sale of Poisons Bill, is decidedly of opinion that in its present form it is not calculated to afford the desired security to the public, while it would be in its operation injurious and oppressive to Pharmaceutical Chemists, and Chemists and Druggists generally, and would occasion great inconvenience to all classes of the community."

He concurred in all that had been said by the President, and he recommended the Chemists and Druggists throughout the country to use their influence with the Members in their locality, and prepare petitions for their presentation against the Bill. All who were acquainted with the trade must know that the Bill before Parliament would not answer the object in view. All were anxious to protect the public from accidents, but the present Bill would not effect it unless it underwent considerable alteration. The Bill was unconstitutional from being retrospective, and he advised the Chemists and Druggists throughout the country to be unanimous on the subject, and act promptly. Their motto should be "one and all," and then much good might be done. They were much indebted to the Council for what had been done by them in reference to this movement. They had watched over the interests of the trade generally, and acted with judgment in waiting till then to make a general movement. Previous interference with the Members of the House of Commons would have been premature, and would have failed to produce a good effect.

Mr. Watts (Brompton) seconded the resolution.

Mr. Ramsey (Ashford) said he had come from a distance to attend the meeting, believing the present to be a crisis in the affairs of the Society. The question was one of considerable importance, and affected the interests of every Chemist and Druggist throughout the kingdom. It therefore behoved them to support the Council, who had hitherto so ably performed their duty. He thought, in asking the members of the House of Commons to oppose this Bill, they ought to furnish them with some valid reasons for so doing, and he suggested the Council should draw up, in a strong but concise form, their objections to the various clauses in the Bill, and forward them to the members for their guidance.

The Chairman said that had already been done, and extensively circulated.

Mr. Ramsey said he had received a copy of the document alluded to, but he thought it did not contain the required information. The members of the House of Commons should be informed what it was that was felt to be inconvenient and objectionable, and what it was that militated against the security of the public and the advantage of the trade.

The Chairman said he had had several personal communications with Members of Parliament, with a view of placing them in possession of the facts of the case. If they furnished hon. Members with a long printed paper, they had not time to read it, and a short one would not contain enough. He thought five minutes, conversation was better than voluminous documents, but a concise statement might be very useful.

Mr. Gould (Kingston-on-Thames) concurred in the suggestion made by Mr. Ramsey. His experience showed him, that after having had conversations with Members of Parliament on subjects of this kind, they wished to be furnished with some document that they might turn to and read over and think about when their minds were disengaged from other matters. The document alluded to that had been sent round to the Members gave sufficient information to those who were practically acquainted with the trade, but it did not convey to others what really were the valid objections to the Bill; and if the members of the House of Lords had known anything of the business they would never have passed this Bill, or at all events they would have listened to the suggestions of the Council with attention and respect. He considered the manner in which the Bill proposed to deal with vested interests by making its provisions retrospective, was unconstitutional, and ought not to be permitted. By supplying the Members of the House of Commons with the objections to the Bill, they would bring an amount of information to bear on the subject which, he thought, could not be resisted, from its being based on uniformity of opinion. The opposition to the Bill would, in consequence, be more concentrated and more efficacious. He suggested, in addition, that the Members of the Society throughout the country should seek personal interviews with their Members (even if they were inconvenienced by so doing), and enforce on them their objections to this Bill. He was astonished to find that any body of men pretending to possess common sense should have thought of attempting to pass such a Bill as this.

Mr. Collins gave the Council credit for the best intentions, but he believed they had been led into a snare in their negotiations with the House of Lords. He thought it was better for the Society to oppose the Bill *in toto*, rather than attempt to remedy its objectionable parts. The President had passed over many inconveniences in the Bill, and so far as he (Mr. Collins) was concerned, he should be loth to tolerate any of them. He hoped the Council and the trade would not quietly submit to the passing of such a Bill, for he felt certain no other trade would submit to such interference as it proposed. He thought the objection to registration of sales might be got over by raising the tariff of prices, and so make the public suffer and indemnify the Chemists and Druggists for the extra trouble. He had great objection to the Paul Pry system for discovering petty delinquency, and he urged that it would be better to throw the Bill over altogether than attempt the hopeless task of endeavouring to extract out of the confused mass before them anything like safety or protection to the public.

Mr. Hooper considered the registration clause, if carried out, would prove fatal to many tradesmen. A Chemist would not be able to give a gentleman camphorated chloroform for the toothache without a witness, and the same with regard to laudanum. Oxalic acid, though not sold by all Chemists, was sold by oilmen. He instanced a case where he had refused to supply it, and the party went to an oil-shop and returned with three pounds he had purchased. The same would be done under this Bill. The Chemists and Druggists would

be the victims of the interference of the medical profession, who were at the bottom of the movement. ("No, no.") Every Chemist was more or less influenced by the medical profession, and they controlled his conduct in this matter. It was an attempt to get the Chemists and Druggists under their thumb, and they would succeed in doing so if the compromise was carried out, and then their existence in the shop would be like that of a toad under a harrow. If they got under the provisions of an Act of Parliament, they would stand no chance before a magistrate or a jury, on the information of a common informer. He considered it was better to throw the Bill over than attempt to mend it.

Mr. Macfarlan said the noble Lords had overlooked Scotland altogether, and forgotten its existence, in reference to this Bill; neither had they recognized Ireland. They would not touch the shamrock — they passed by the thistle, and only smelt the rose; but in doing so, they forgot the thorns. Possibly before long they would find them. The Society did not ask for the Bill. What they desired was, as the President had explained, to elevate the position of the Chemists and Druggists, and raise them from a mere trading business to become a branch of a learned profession, and stand well before the public. They had happily succeeded in some measure in attaining that object when this Bill was introduced into Parliament, because some poisonings had taken place at which noble Lords had become greatly alarmed, and having little to do at the commencement of the session of Parliament, they thought they would do something, and commenced with poisons—a subject of which they had very little practical experience, and he need not say how they had signally failed in the attempt. He ridiculed the distinction that had been made by the Bill between parliamentary poisons and real poisons, and approved of the drawing up in a plain and intelligible form, for the guidance of the House of Commons, their reasons for disagreeing with the Bill. The object of the Council was not so much compromise, as to obtain a useful Bill for the community; and he was quite ready to make a little sacrifice, if the public safety was to be secured thereby. He believed the Chemists and Druggists throughout the country were becoming more and more satisfied that the real safety of the public was to be found in improving the professional education of the members of the profession. This Bill, if passed, would relieve Chemists and Druggists of personal responsibility, by placing it entirely on an Act of Parliament, which took upon itself the responsibility. They should remember that union is strength; and if the Chemists and Druggists only united, he felt certain they must prevail, and throw out this Bill, which would enable them on a future occasion to introduce a Bill that would be less oppressive to them, and more beneficial to the public at large.

Mr. Pedler hoped this Bill would share the fate of the other Bill introduced into the House of Lords for regulating the sale of poisons. It was impossible for a Bill of this kind to work well, and he felt satisfied their grounds of opposition were so strong that they must prevail. The time, however, had arrived when a Sale of Poisons Bill must be passed, and the question was, whether they should have a good Bill or a bad one. The proper place for poison was in a Chemist's shop, and Chemists were the proper persons to be entrusted with its sale on their own responsibility. The public had no doubt been alarmed at the poisonings that had taken place of late years, and looked forward to a provision of this kind to stop them, but when they became aware of the facilities this Bill afforded for persons obtaining poison, they would join the Chemists and Druggists in opposing such legislation as this. From the facilities this Bill would afford for their possession, and the probability of the public being obliged to purchase larger quantities than formerly to avoid the trouble of registration, it would have the effect of turning every private house into a retail Chemist's shop, and the chances of accident would be far greater than now. The stringent and annoying provisions of the Bill as regarded Chemists

and Druggists, would have the effect of inducing the respectable members of the trade to decline selling parliamentary poisons as they had arsenic, and the sale would consequently get into other hands. He thought the trade and the public were much indebted to the Council of the Society for the trouble they had taken in the matter. Unless they could get a really good practical Bill, they had better be without one.

Mr. Dickinson considered the Chemists and Druggists should exert themselves, and get the Bill thrown out of the House of Commons. He complained that the Bill was only aimed at a portion of the Chemists and Druggists of the United Kingdom, and not all of them. The Pharmaceutical Society was operating most beneficially for the protection of the public, and the manner in which accidents from poison were diminishing was highly satisfactory.

Mr. Compton was opposed to the Bill. The proposed Board of Examiners would produce the ruin and degradation of the Pharmaceutical Society as a governing body.

Mr. Sturton (Cambridge) spoke of the great inconvenience both to the seller and purchaser that would result from the registration clause. He had conducted a business at Cambridge for nineteen years, and though he was in the habit of selling 28 lbs. of oxalic acid in about six months in half-ounce, ounce, and quarter-pounds, he had never met with an accident. This was sold to parties engaged in straw bonnet cleaning, and the consequence would be that these parties, instead of buying it by pennyworths and twopennyworths, would have to buy it in half-pounds, and as it would be left about in various places in the cupboards that were not subject to inspection, the oxalic acid would, in all probability, be often taken for Epsom salts, and more accidents happen than at present. He sold laudanum, and he had never met with an accident since he had been in business. This Bill would destroy the moral responsibility of the Chemist and Druggist, an instance of which he gave to the meeting. About three weeks ago a person came into his shop and asked to be supplied with six-pennyworth of laudanum. He refused, but the party obtained it of another shopkeeper, and applied it to the destruction of his own life. Another party applied to him for cantharides, which he refused to sell. In both cases he had his suspicion of the uses to which they were to be applied, but under this Bill the Chemist's suspicion would be of no avail, for he would be compelled to supply the customer with what he wanted, provided he complied with the provision of the clause. If noble Lords had been behind a Chemist's counter for a week, they would have known better the wants of the people and the requirements of the trade. He contended that the accidents by poisons sold over the counter were considerably less than those from guns and other causes, and who would think of interfering with the gun trade in consequence, as it was proposed by this Bill to interfere with Chemists and Druggists?

Mr. Cotton said he had been in business thirty-four years and had never kept oxalic acid, nor had he sold prussic acid for the last thirty years. Cantharides he never sold, and he found by putting them at a guinea each an effectual check to their sale. He had refused to supply his best customers with chloroform and strychnine, and his rule was never to supply them except to professional men, or on their written order.

The Chairman said such a meeting as that showed how difficult it was to legislate on this subject for the whole of the kingdom, owing to the various demands arising from the requirements of the particular locality—one selling one poison, and another another. This Bill had been drawn up by men who possessed no statistical information on the subject. He was convinced the best course for them, after what had taken place, to pursue was to oppose the Bill altogether. He referred to the difficulties of amending a Bill of this kind in committee. It might come on at a late hour, and the objections receive no attention. He thought, however, if they persisted in their opposition, and used their utmost exertions, they might succesfully resist the second reading. In

coming to the resolution of opposing the Bill, no blame rested on the Pharmaceutical Society. For seventeen years the Society had persevered to get a good Poison Bill passed, but they would not have a bad Bill if they could help it.

The resolution was then carried unanimously.

Mr. Dickinson, moved the following resolution :—

"That in the opinion of this meeting the Bill passed by the House of Lords, called the Sale of Poisons Bill, should be by every constitutional means opposed in the House of Commons, with the view of preventing the Bill becoming law." He thought the resolution was necessary to strengthen the hands of the Council with regard to the future proceedings in the matter. If they used their influence properly he felt satisfied they would be successful.

Mr. Collins seconded the resolution. There was no possibility of their modifying the Bill, and the best course was to oppose it *in toto*. They could not and would not work such a Bill.

The Chairman said he entirely concurred with the unanimous feeling of the meeting, viz. that they must oppose the Bill.

The resolution was carried unanimously.

The Secretary (Mr. Bremridge) then read the petition which had been drawn up by the Council and signed by them that day, and also the following petition, which it was proposed should be signed by the members of the Pharmaceutical Society at the meeting.

To the Honourable the Commons of Great Britain and Ireland in Parliament assembled.

The petition of the undersigned Members of the Pharmaceutical Society in Public Meeting assembled,

Humbly showeth,

That your petitioners have for many years been endeavouring to promote improved legislation in reference to the sale of poisons, which object they believe can best be accomplished by placing that responsible duty in the hands of persons qualified by education to perform it with discretion and safety to the public.

That the regulations in the fourth and fifth sections of the Sale of Poisons Bill now before your Honourable House would inflict serious inconvenience and annoyance on your petitioners and the public, and, instead of affording security against crime and accident, would tend to increase the danger, first by giving a legal sanction to the sale of certain poisons now scarcely, if at all, accessible to the public; secondly, by inducing purchasers to obtain larger supplies of poison than they require for present use, to save themselves the frequent repetition of the annoyance.

That the appointment of a new Board of Examiners is uncalled for and quite unnecessary, the Pharmaceutical Society having every facility for the efficient performance of the duty under the 15th and 16th Vict., cap. 56, and that the power of the Society to extend its beneficial influence would be greatly diminished by the institution of a new Board granting certificates without requiring the same or an equally efficient course of study.

That the entry and searching of shops by the Examiners is invidious and objectionable.

That the institution of a compulsory examination for persons already in business is unprecedented and unconstitutional.

That the proposed penalties are unjust and excessive.

Your petitioners therefore humbly pray that your Honourable House will not pass the said Bill in its present objectionable form.

Proposed by Mr. Colbeck, of Leamington.

Seconded by Mr. Ramsey, of Ashford.

"That the petition now read be adopted by this Meeting, and that the Right

Honourable Sir Benjamin Hall, M.P., be respectfully requested to present it to the House, and to support its prayer."

After a little discussion and a verbal amendment (the words, "in its present objectionable form" at the end of the petition being expunged at the wish of the meeting), the resolution was carried unanimously. It was then

Proposed by Mr. RAMSEY, of Ashford,

"That a short and clear statement of the grounds of objection to the several clauses of the Bill be prepared and sent to every Member of the Pharmaceutical Society and other Chemists, to be used by them in their communications with their representatives in Parliament."

Mr. GOULD seconded the resolution. The statement should contain practical objections which would be intelligible to persons not in the trade. It would be impossible to carry out such a Bill if passed. It would raise up a host of informers. Being in the commission of the peace, he had some experience with regard to such persons, and under this Bill he would have no power to refuse to take an information, and for the third offence the lowest penalty was £20. It would be a degradation to the Chemists and an injury to the public. No greater security for the care of the Chemist could be given to the public than that now existing. He carries on his business in constant anxiety and watchfulness, knowing that any accident occurring in his house might cause his ruin. No penalties, nor even the dread of informers, could make him more cautious.

Mr. Gould named several cases in which he had refused to sell laudanum, which the parties had obtained elsewhere. In one instance he refused to sell prussic acid, and the person was afterwards found drowned in Teddington Lock. The discretion of the Chemist was the best security the public could have. The defects of the Bill had been so clearly stated, he need only urge that the substance be concisely stated in a form which could be used by Members in communication with their representatives in Parliament.

The CHAIRMAN said the document could be prepared and printed in less than twenty-four hours.

Mr. WAUGH reminded the meeting that there was no provision for giving informers a share of the penalty.

The CHAIRMAN said that private malice was as bad as the pecuniary motive, if not worse.

Mr. WAUGH thought a share of the penalties would be the most exciting motive, but private malice might do some mischief. He objected to the Bill altogether in its present form.

After a vote of thanks to the Chairman for his conduct in the chair, and also for his general exertions on behalf of the Society, which he duly acknowledged, the meeting separated.

ORIGINAL AND EXTRACTED ARTICLES.

AMBROSE GODFREY HANCKWITZ.

Date 1660—1740.

BY MR. JOSEPH INCE.

AMBROSE GODFREY HANCKWITZ was brought over from Germany while very young, by the Honourable Robert Boyle, in order to assist him in his chemical researches. Frequent reference is made by Godfrey to Boyle as his "honoured master," and he states expressly that he received a salary from him.

The surname Hanckwitz was dropped by his eldest son, as not suiting the English tongue, since which time the family have been known only by the name of Godfrey.

Ambrose left behind him a great mass of papers, including letters, diaries, pamphlets, chemical observations and receipts; he was also in the habit of noting down passing events in his account-books; from these sources, as well as

from old engravings, I have endeavoured to convey an impression of the Pharmacy of the seventeenth century, and, the better to accomplish this, I have invariably, where possible, made Godfrey tell his own narrative in his own words.

The quaint style of this period will not be unpleasant to the antiquarian, though, it must be confessed, it lacks the clearness of a modern essay. The reader will at least be spared the weariness of the original handwriting, which is cramped, full of contractions, and unfettered by any rules of punctuation.

Godfrey is first met with in obscure lodgings in Chandos Street, with a wife and family, and very narrow means. Soon afterwards his prospects brightened, and he built furnaces, and set up stills in Maiden Lane.

The Chemists of that day seem all to have been believers in Alchemy, expecting to unravel some wondrous secret which was to endow the discoverer with superhuman power. Therefore, when any of them succeeded in producing anything new, the mode of preparation was kept profoundly hidden, while the result was lauded in the most extravagant terms. Phosphorus was one of these "Arcana," and when it was first made by Brandt of Hamburg, the method of its production was guarded with jealous care, and the praises of "the wondrous lumen, the agens intrinsicum" were vaunted in the most fantastic and highflown phraseology. (Vide *Pharmaceutical Journal*, vol. xiii., page 280.) "There was then presently true and confirmed that holy proverb, where there is carrion there eagles do gather. How nimble was not the curious Dr. Kraft in Hamburg? and gave the preparer 200 dollars only to get some into his hands; and Kunckell travelled also thither to inquire and to find out that wonderful lumen, who gave himself the utmost pain only to know where in this Brandt had worked. Even this same Kunckell brought out his producta phosphorea for a show, as well to the Court of Saxony as after to that of Brandenburg: he let have also out of friendship several portions to diverse professors in Germany, who then as soon as he could get some ready, did commit it to Mr. Linck at Leipsic to sell; but there was little of it, and it was got with tedious labour and pain. At last our grand Boyle got it by *lytterall* correspondence and word of mouth out of Saxony: who afterwards as he had instructed his Chymist Mr. Bilger, gave it him to do, and he being gone, would instruct me in it too; but before he mistrusted anything whether I could make it, I had the honour to present him with an ounce of my own making, which he accepted with much satisfaction."

Mr. Bilger, whoever he may have been, seems from henceforth to have lost a point in Boyle's estimation, while Godfrey was promoted to the rank of a private and confidential friend. In order to continue his researches into the nature of "the marvellous lumen," he travelled through Holland, France, Italy, Naples, and Germany, and, in the manuscript record of his pilgrimage, chants his own panegyric in no minor key. He failed in those enlightened regions to find "even one that could make even that poor daubing stuff as Kunckell's out of the usual microcosmical matters. I should have been satisfied if any one could have but showed me Kunckell's opaque and unctuous phosphorus." Seeing then that he could gain little information from continental philosophers, Godfrey was determined not to be too lavish in personal explanations. "And though I impart now so much light of its preparation as not any one before me has done, I will still keep something back, but will impart to please the curious what curious ideas, although mechanic, I have collected out of the mouth of those Secretioris Chemiæ amatorum (amatores) of this affair. Because though this affair should amount to nothing, yet it is at least an amusement, and that there sometimes occurs amongst it here or there an experiment not to be rejected. These people would show me other methods, and their discourses did run in a particular carrier (career) as hanging at a cord, how they namely did endeavour to find out the innermost abyss of nature itself. How, and in what manner the most secret product of all things have happened in the

first creation; what (was) the cause of life, the growth of multiplication, of concretion in all the three reigns of nature, in vegetables, animals, and fossils, before their first origin from time to time. Also what might be their innermost first universal agens. This studium they did cherish for that sake so diligently, that they by an insight thereof might imitate the most secret works of nature, these joynt species, with the assistance of the quintessence of all created creatures, how to multiply them in the most wonderful manner, in subjectis adæquatis. But particularly would they feign have assisted opprest fellow-creatures, as well in dangerous diseases, as in comfortless poverty, and to work out an universal medicine and metallic tincture with which all might be transmuted into gold. Yet they say also, they would not matter so much the last, as that of the most perfect knowledge of nature which would pave the way for the true knowledge of God and all creatures. In truth there never wanted such sort of people, that spared neither cost nor pains to discovery this mystery, incomprehensible to me. And there have already appeared for some ages, those that have adored these two idols, Health and Riches of this declining life, and in order to ketch that for themselves, have endeavoured their utmost, so that one might very aptly say, Quo non mortalia cogis auri sacra fames?"

But if Godfrey held in slight estimation the practical capabilities of these imaginative Chemists, he cherished the firm conviction, that though for his own part he talked less, he nevertheless did more. "For, notwithstanding that most part of these people busy themselves with microcosmic matters, and have worked therein many years very penibly and laboriously, yet have they not been able to make the phosphorus, nay not so much as they would need for their great opus. It is therefore from thence best known to me what sort of questions these forty years have been put to sound me, also how much I have sold for suchlike uses." "In the meanwhile I very willingly leave over unto them their whole chimeras, with all their private thoughts, as well for their macro as their microcosmic matters, as also of this our product, and wish them also much luck for it and say Proficiat, for it is yet a small revenue for my slavish labour that I have spent upon the invention of this." "Also it must be allowed to me that there is something particular in my method. For I doubt not, if others could have brought it to that pass, they would as well as I have wished to prepare it in quantity. But I have dato (during) these forty years seen no other person yet, who could make it venal in quantity as I have done."

Godfrey's success in this preparation evidently made him a noted man: learned doctors came to visit him in his laboratory, and on state occasions he was invited to be present at the experiments of other people.

Against two sets of virtuosi he waged continual war—the philosophers whose grandiose discourses outweighed their common sense, and the whole tribe of alchemists. There is scarcely a page in his voluminous writings that does not contain some quiet sarcasm against these twin pretenders. Godfrey worked hard, and arrived at his conclusions by laborious investigation, and he was therefore little content to allow others to create a temporary sensation on the very slender basis of a few well-turned expressions. "Dr. Dickinson, whom I knew particularly, who many years frequented my laboratory, as I had likewise access to his, presented me once a piece of metal looking like a regulus, which he had melted out of stercore humano, and made me much praises of this microcosmical matter, upon which also because of the art his whole confidence was grounded, though I know how to extract out of it a regulus at any time, and so did not matter it (think anything of it). If I could remember still all their discourses, and to set them down here, which he had several times held to me in his laboratory in St. Martin's Lane, the curious reader would highly wonder how it is possible to perorate so many fine things de stercore. But I as a *didimus* thought of it oft within myself on the emblema of their astronomers, where they are used to be painted, to stand in circle, and the globe of the world in their midst, with this superscription, mundum tradidit disputationi illorum;

only with this distinction that I did set for that word (mundum) merdam, as I could but imagine to myself that these adepti, instead of the globe of the world, had placed their microcosmical matter upon the table, in the middle. But should I open my mind so much, I say, the Scripta Philosophorum are like an image of wax, which may be pressed into all sorts of forms, and all they write are double meaning oracula and amphibolia."

Ambrose, though possessed of the caution of a Chemist and a German, had been fearfully outwitted by a professional Rosicrucian. It happened at a time when he could least afford it, for he was then a young man with a reputation to make, and a wife and family to keep. Narrowed circumstances weighed on him heavily in his humble Chandos Street lodgings, added to which this foreign charlatan not only betrayed the profoundest ignorance, but managed to eke a living out of Godfrey's necessities. When the cloud passed away, Godfrey devoted his entire energies to ridiculing the men, their system, and their works; consequently nothing pleased him better than to find how signally they failed in producing Phosphorus, and sought refuge in magniloquent descriptions. In this, the seventeenth and nineteenth centuries are alike; people when they know little, talk fine. "Yea when we come first upon the nomenclature thereof, they cannot invent words glorious enough with which these excrementa polychresta are to be named, and to be hidden. Sometimes they are altogether taken from the heathen gods: one must be the beautiful Diana, the other their balneum, their Venus and Mars; their Mercurius by no means vulgar but Philosophorum, their sun, immo (yea) their Parnassus, and entire Helicon, with Apollo's golden lyre: their Moschus occidentalis, the golden rain of Jupiter, which he lets fall into Juno's lap, and so forth. Not only for the sake of being hidden, but also out of courtoisie and great modesty these so nominated adepti do use to load or to charge their materiam vilem et ubique reperibilem with such high names." Brandt himself, described by Godfrey as "old honest Brandt of Hamburg," falls under his censure for adding romance to reality. "This Urosophus had no sooner thrown his eyes upon the wondrous birth of this fire but he fancied presently he was arrived in the Garden of Eden, which the cherub did defend with the fiery sword; he believed himself to be now actually the second Prometheus who had stole that heavenly fire from Titan's chariot, or a flambeau or torch kindled by the sun; he thought he had now brought forth upon earth the shining Titanian of the Phaetons, forerunners of the Sun's chariot, that he did possess according to Orpheus and Hesiod, the clear rising light and the central fire itself which continually forth and forth rises up out of Demorgontis' lap. He had now the quintessence shut up into his crystalline prison, and as long as he entertained himself with these very high adeptic notions, and hung his heart so fast to it, that it was not possible to know the composition of it; for he esteemed this glorious fire of nature much too high, and was in fear of the heavy philosophic curse, calling himself to mind, that, he that did but name the subjectum lapidis by bare name, or take it in the naked hand, much less upon the tongue, as Hellmont, would be anathema."

Godfrey, however, could be occasionally pathetic; a good heart was at the bottom of his cynicism, and, with his allusion to the death of Brandt this account of Phosphorus must close. "In the meanwhile, as all things have their period so has also the vitalis lucula (scintilla, spark) by approaching age. By (in the case of) this urosophus Brandt, it daily lessened and wore off, till at last in the midst of his best experiments it e'en quite extinguished. His fine stare fire, which through art he produced, remained for his memory longer with us than himself; yea it was more durable than his own radicale humidum, and shined longer than his flammula vitæ, that in time of his best occupation did turn and return to its fiery sphere. His acquaintances and confidents would feign (if wishes would have done it) have retarded his decrease to set it farther off, since they believed nobody but him that was so fortunate as to discover

such a noble secret would also be more fitter to bring it to a good end; and this their magnum opus philosophicum succeeding, they had and made great hopes of him, sed frustra, as most times it happens, that after the wise sentence of Seneca, every one amongst his most principal negociations takes leave of this world, et omnia sunt hominum tenui penitentia filo."

(To be continued.)

REPORT OF THE

RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION,

AND OF THE

APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

BY B. H. PAUL, Ph.D.

(*Continued from p.* 25.)

Chemistry of Beer Brewing, &c.—The technical literature of this subject presents a great number of discrepancies with regard to all the operations, from malting to fermentation, and the consideration of the subject from a chemical point of view suggests a great variety of questions, the determination of which is essential for the thorough explanation of the chemistry of beer brewing. It is not possible, however, to obtain from the works of Balling, Otto, Ure, &c., the requisite data in so complete and indisputable a form as is requisite.

These circumstances have induced Mr. Habich, of Boston, to undertake some experiments, with the view of supplying the deficiencies to some extent.

With regard to the preparation of malt there are not any comparative quantitative analysis of raw and malted barley which would admit of any well-founded inference as to the change that takes place in malting. All that is available in regard to this question is the investigation by Saussure of raw and malted wheat. He found that by malting, the amount of sugar and gum was augmented, while the starch and gluten were diminished. The production of diastase, in proportion as the gluten diminished, was a result that might have been expected. But it still remains questionable what particular portion of the mixture of substances known as gluten, gives rise to the diastase in malting. Is this substance produced from the vegetable fibrine or from the vegetable gelatine?

With the object of ascertaining this, Mr. Habich has examined the wort before the addition of hops. This wort is known to contain free phosphoric acid, and both the vegetable fibrin and gelatin are soluble by means of this acid; consequently, if both substances were present in the malt, it might be safely inferred that they would both be found in the wort.

The wort examined by Mr. Habich was found to become turbid on cooling. The addition of a little ammonia considerably increased the turbidity, and after a few minutes there was deposited a heavy lilac-coloured precipitate, the liquor above it being perfectly clear and somewhat darker coloured than before. Upon the sides of the vessel a crystalline precipitate was deposited at places which had been rubbed with a glass rod. When ammonia was added in excess the coloured precipitate dissolved again, and there remained a white crystalline sediment of ammonia and phosphate of magnesia. When, instead of ammonia, a solution of bicarbonate of soda was added to the wort, turbidity was likewise produced, but the separation of the lilac-coloured precipitate took place more slowly, and it remained flocculent, owing to its containing phosphate of magnesia.

When the precipitate produced by ammonia was washed with cold alcohol, a large portion (vegetable gelatin) of it was dissolved, and there remained as residue, ammonia phosphate of magnesia, mixed with a little vegetable fibrin. The large preponderance of vegetable gelatin sufficiently proved that it is the fibrin which furnished the material for the production of diastase during the germination or malting. The fact that phosphorus is an essential constituent of vegetable fibrin would, therefore, account for the occurrence of the phosphoric acid in the malted grain, and consequently in the wort.

But the free phosphoric acid contained in the malt is insufficient for the whole of the vegetable gelatin. A larger quantity of this substance is dissolved by the hot water, and this quantity is larger in proportion to the temperature maintained during the mashing. However, this portion of vegetable gelatin is again separated as the

wort cools, and this causes the subsequent turbidity of wort that is quite clear while hot.

It would be a question well worth investigating, what may be the nature of the chemical change which takes place in the conversion of vegetable fibrin into diastase. The satisfactory elucidation of this change would remove a very great deficiency in the chemistry of brewing and fermentation. At the present time our knowledge of diastase is exceedingly imperfect, and even with regard to its qualitative composition there are opposite statements, it being in some works described as a non-nitrogenous substance, while in others it is stated to contain nitrogen.

The obvious alteration that the grain undergoes in germination arises from the alteration of the vegetable fibrin. The compact structure of the raw grain, as compared with the cretaceous character of the malted grain, is due to the presence of vegetable fibrin.

In Scotland the malting is conducted at a very low temperature, and the germ is allowed to grow from one end of the grain to the other before the germination is arrested. The temperature of the malting-house is kept at 55° F., and the germination lasts over from sixteen to twenty days. When the germ has attained the full length of the grain, the substance of the grain is so friable that it may be crushed to powder between the fingers. It is worthy of notice that the grain presents this condition on the ninth or tenth day.

When the growth is stopped at this stage, the malt yields a good beer. But when the germination is allowed to progress further, the grain becomes hard again, and the malt in this condition is less suitable for brewing. It is only when, by continued germination, the soft state has again been produced, that the process is complete. It would be highly desirable to obtain chemical data by an exact investigation of the grain in their several stages of malting that would throw a light on the nature of the process.

In connexion with the preparation of wort very important errors prevail. Thus, for instance, the difference between thin and full-bodied beer is attributed to the greater or less amount of dextrin. It has been assumed that the boiling of the mash contributes to the production of full-bodied beer, because it is supposed that a large portion of the diastase is destroyed, and consequently the conversion of the starch into sugar cannot be complete. It has also been said that a portion of the malt extract remains, that, although capable of undergoing fermentation, is, nevertheless, not fermented, and communicates to the beer the full-bodied character.

Mr. Habich's experiments have led him to adopt a different view of this marked difference in the character of beer. He states that the amount of vegetable gelatin in beer varies considerably according to the way in which the wort is prepared, and that this is easily ascertainable. He states, also, that he has never met with beer the fermentation of which has been carried to the extreme limit that was free from vegetable gelatin, the presence of which might always be detected by means of a solution of tannic acid, after the absence of dextrine was proved by means of a solution of iodine. The examination of beer in this way showed that in proportion as the full-bodied character increased, so did the amount of vegetable gelatin increase. It was also ascertained that the amount of dextrin in well prepared wort was altogether insignificant, notwithstanding the full-bodied character of the beer. Hence it appears that by carefully regulating the amount of vegetable gelatin, it is possible to produce beer of any required character.

With regard to the use of hops and their influence on beer, the most diverse opinions are entertained. Balling regards the essential constituents of hops as volatile oil, bitter substance, and resin ; in another place he mentions also the tannic acid they contain, but says that it may possibly be injurious.

When it is remembered that in brewing in pans the whole of the volatile oil of the hops must be driven off, and that, when this oil is added to beer, after the principal fermentation has ceased, the subsequent fermentation is retarded considerably—when, further, it is remembered that this oil is so remarkably liable to decomposition, that the solution obtained by distilling hops with water loses its peculiar aroma within twenty-four hours, and gives to beer an entirely different character—it may, perhaps, be more correct to regard this constituent of hops as having little importance in the preparation of beer.

As for the bitter substance of hops, it is entirely a matter of taste what degree of bitterness beer should have. As a general rule, this character is not approved of.

Moreover, it is questionable whether a more agreeable bitter than that of hops might not be employed.

Mr. Habich has found that the resin of hops is taken up by the wort even without the aid of the volatile oil, to which Balling has ascribed a certain efficacy in determining the solution of resin. With the apparatus used by Mr. Habich in brewing, the hops are subjected to the action of steam until the water that passes away has no longer any smell. This water is not used, but he adopts this course because the wort vapour is employed directly for mashing, and a small amount of hop oil appears to retard the saccharification in mashing. The hops thus swelled, and free from volatile oil, are then extracted by passing through them the boiling hot wort. A large quantity of the hop resin is thus dissolved by the wort, and is separated during the fermentation.

It was ascertained that the solution of the hop resin could not be due to the influence of any residual oil, by an experiment in which the wort, after treatment with hops, was boiled for four hours under a pressure of one-fifth of an atmosphere, was then run into a cooler, and afterwards, when it had a temperature of 8 deg. R., run quite clear into the fermentation vat. There was, however, just the same separation of dark resin during the fermentation.

This would appear to show that the hop resin exercises a special influence in the process of fermentation. It is known that acids such as tartaric, urlic, lactic, and acetic acids have an influence on the fermentation, and therefore it is probable that the hop resin has also.

The influence of the tannic acid in hops Mr. Habich thinks has been under-estimated by Balling, in his work on the chemistry of fermentation. There certainly is no reason to suppose that it is converted into gallic acid in the beer. However, beer does not contain any tannic acid, even when a large proportion of hops has been used, as may be readily ascertained by testing with iron salts. On the contrary, all the tannic acid is separated in combination with vegetable gelatin. But the tannic acid originating from the hops is by a long way insufficient for the separation of all the vegetable gelatin, so as to produce a first class thin beer.

Otto and Siemens, in their work on brewing, have in the main adopted Balling's views with regard to the tannic acid; however, they believe that it serves the purpose of separating dextrin and mucin. But when it is remembered that well prepared wort never contains dextrin, and that mucin is considered to facilitate fermentation, there does not appear to be any ground for this opinion.

Mr. Habich has observed, that wort containing but little vegetable gelatin, yields a remarkably white yeast, and the beer clears much more rapidly. The separation of the compound of tannic acid and gelatin in the brewing vat must act as a means of clearing the wort from the substances that cause turpidity. But when the hops do not contain tannic acid—as is the case with old hops, in which it has been converted into gallic acid—the wort obtained is turbid, and contains gallic acid. Hence the use of old hops is not only without advantage, but positively prejudicial.

In the preparation of thin beer, like the Indian pale ale, the tannic acid of the hops would be insufficient for the separation of all the vegetable gelatin, unless so large a proportion were used as to render the beer too bitter, and in this case the requisite amount of tannic acid must be obtained from other sources.

It may be questioned whether a complete separation of the vegetable gelatin is requisite for the production of good beer. With regard to this point experience affords the following data:—

When beer has passed through all stages of fermentation, and has arrived at maturity, a decomposition of the remaining unaltered vegetable gelatin commences.

The entire separation of this gelatin cannot be effected by means of tannic acid, because that portion which is held in solution by phosphoric acid is only partially precipitated by tannic acid. The solution of vegetable gelatin in phosphoric acid, mixed with excess of tannic acid and filtered, gives, when mixed with some alkali, a further lilac-coloured precipitate.

But in proportion as the separation of vegetable gelatin is more complete, the liquid loses the character of beer, and in regard to this particular there is a wide field for investigation. The results that Mr. Habich has obtained he describes as highly satisfactory, and states that his practice is to separate a very considerable portion of the vegetable gelatin from the wort before fermentation, so that the wort is never run into the fermentation vat with the quantity of gelatin yielded by the materials used in its preparation.

In the fermentation the greater or less amount of vegetable gelatin present in the wort is indicated by the slower or quicker clearing of the beer in the tubs. The vegetable gelatin may be present in the beer in two states—either dissolved by and perhaps combined with phosphoric acid, or suspended in the liquid. It is the gelatin in this latter condition that so frequently interferes with the clearing of beer, owing to the slight evolution of gas during the progressive fermentation in the casks, keeping the small swollen particles of gelatin suspended. This can be prevented only in two ways ; either by allowing the wort to settle well in the cooler, and in drawing it off, taking particular care to avoid stirriug up the sediment, which contains, besides coagulated albumen and tannate of gelatine, the flocculent gelatin; or by filtering the wort. This latter operation is quite unavoidable in summer, and it may be accompanied by artificial reduction of temperature.

Mr. Habich considers that his experience does not justify the inference that the compound of gelatin with phosphoric acid contributes in any way to the production of yeast; at least he has found that the clear beer wort and the filtered beer, after the principal fermentation, required nearly the same quantity of tannic acid solution to produce perfect precipitation of gelatin.

Then since the other nitrogenous constituent of malt, the albumen, is also completely separated by the temperature of the wort, it can be only the diastase altered by boiling that furnishes material for the production of yeast. This would account for the well known fact that the addition of ground malt, or of a cold infusion of malt, considerably increases the susceptibility to fermentation of wort, and is followed by a proportionate increase in the quantity of yeast produced. A similar effect is not produced by the addition of either gelatin or albumen.

Mr. Habich does not venture to offer any opinion as to whether the mucin contained in raw grain contributes in any way to the production of yeast. The results of his experiments in reference to this particular are not yet sufficiently decisive. But when it is considered that beer made from malted barley and raw malt has always less tendency to ferment than that made from malt alone, the influence of the mucin appears questionable.

With regard to the prevalent opinion that fermented liquors contain alcohol in a free state, he directs attention to the following facts as opposed to this view:—

When beer containing three per cent. of alcohol is mixed with pure alcohol sufficient to render the amount of alcohol four per cent. and beer wort containing fourteen per cent. extract is fermented until the attenuation has advanced to the point corresponding with four per cent. of alcohol, a comparison of the two liquids shows that there is an immense difference between them, consisting chiefly in the smell and taste.

Further, it is a very significant fact that beer and diluted spirit, both containing the same amount of alcohol, present very great differences in their relation to dextrin. Both beer and wine dissolve dextrin in large amount, while, on the contrary, dilute brandy dissolves but very little.

The opinion that the alcohol in fermented liquors is combined with some nitrogenous substance was put forward some thirty years ago by Meissuer, and was founded upon good grounds. The only defective point was the absence of any recognized constant relation between the amount of nitrogen and that of alcohol in the product of fermentation which was free from gelatin, albumen, &c.

Döbereiner long since observed the evolution of ammonia when fermented liquids are boiled with caustic alkali. He believed that this ammonia exists ready formed in these liquids, but that cannot be the case, since beer is known to contain free phosphoric acid. If it was in the state of an ammoniacal salt it would be phosphate of ammonia; and as this salt could not remain in solution in the presence of phosphate of magnesia, but would be separated in combination with it, the liquid would be rendered free from ammonia.

Dr. Habich has instituted a series of experiments, which he hopes will throw some light on this subject.

Volatile Oils from Resin, &c.—The distillation of American pine resin for the preparation of lubricating oil, which is now very extensively practised, has given Dr. Vohl* the opportunity of studying the bye product of this operation.

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* *Polytechnisches Journal*, cxlvii., 304 and 374.

When the distilling vessel containing about half a ton of resin is first heated, there passes off together with the water of the resin a small quantity of a light ethereal oil, amounting on the average to about two per cent. The water mixed with this oil is very acid, owing to the presence of a considerable quantity of acetic acid, and sometimes formic acid. The oil is generally rectified and sold as turpentine. The low price of this oil soon secured it a ready sale, but as it was found that it would not serve as a substitute for turpentine in mixing paint, &c., and consequently another application had to be found for it, Dr. Vohl found that by treating it with caustic alkali, and then distilling it by means of steam, it could be advantageously used for burning in lamps. For this purpose it is better than camphine, in being less liable to resinify.

This oil was found to have nearly the same composition and the same density as turpentine. It is prepared by Messrs. Brambach of Borbeck, under the name of pinolin.

Some other products of a similar kind have been obtained by Dr. Vohl from waste soap liquors, and the fatty waste from cloth factories, &c.

The method adopted for this purpose was to obtain the fat in the state of a lime compound, by adding sufficient chloride of calcium to the soap liquors or otherwise, then collecting the lime soap upon a filter, pressing it dry, mixing it with ten per cent. of fresh lime, and distilling the mixture from an iron retort with a shallow head. At the commencement of the operation, an abundance of water vapour is disengaged for a while, then empyreumatic vapour appears, and as soon as the gas burns with a bright clear flame, the proper decomposition has set in. After this, the gas is conducted under the retort and burnt with due precaution, and the volatile oil condensed. As soon as the gas which escapes condensation burns only with a pale blue flame, and consists merely of carbonic acid, the operation is at an end. The receiver contains a watery liquid upon which floats a large quantity of a butyraceous mass, which has a penetrating smell of burnt fat. This mass is submitted to fractional distillation, and yields one third of any volatile liquid oil, another third of thick oil, the remainder being solid at the ordinary temperature.

These three products are purified by means of sulphuric acid and steam, by which means there are obtained a clear colourless oil of 0.800 density, with little smell; a solid material similar to paraffin, and a thick oil that does not contain oxygen, is not liable to undergo resinification by exposure to the air, and is well suited for lubricating machinery.

The volatile oil is called oleon, and may be used for burning in lamps.

Dr. Vohl has also examined mineral naphtha in a similar manner, and finds that, by fractional distillation, it yields—

Light oil (0.8525.8)	41.705	100.000
Paraffin	51.077	
Asphaltic residue	4.600	
Water and gas (olefiant gas and sulphuretted hydrogen)	2.618	

The oil treated with sulphuric acid and alkalies, and distilled by means of steam, yielded—

Photogen oil (0.8305.8)	40.705	100.000
Lubricating oil	40.999	
Paraffin	6.078	
Asphalte	4.600	
Gas, water, creosote, and carbolic acid	7.618	

The photogen oil was clear, colourless, and of agreeable smell. It burnt in the ordinary camphine lamp without giving off any odour or carbonizing the wick to any extent.

The lubricating oil was almost without smell, and could be used for machinery, or for burning in argand lamps. Neither this oil nor the former are in the least degree liable to oxidation by exposure to the air.

The paraffin was very white, and melted at about 60° C.

Charcoal Paper for Filtering and for the Preservation of Food.—Messrs. Pichot and Malapert* have succeeded in preparing paper containing a greater or

* Armengaud's *Genie Indu striel.*

less proportion of powdered animal charcoal, previously purified by acid. The charcoal is either mixed with the whole pulp, or, in making the paper, is inserted between the layers of pulp, so as to form an intermediate layer in the paper.

As the mixture of charcoal with the pulp lessens the strength of the paper, this objection must be removed by inserting a piece of gauze in each sheet of paper, or only in the centre of each sheet when they are required to be used as filters, so as to strengthen that part which forms the point of the filter.

The pulp for this paper may be made of hemp, linen, or cotton rags, and for especial purposes, woollen or silk rags may be used. All the materials are purified as much as possible without the aid of soap or alkaline substances, and with water as free as possible from earthy salts. The paper is made of different thicknesses, and may be used for wrapping fish, game, and flesh that is to be sent to a distance.

Chemistry of Cochineal.—It has long been known that when cochineal is left for some days in contact with solution of ammonia, it undergoes a change that has not been examined by Chemists. The red pigment—carminic acid—becomes violet, and is not again altered by acids, nor convertible into red by them. Consequently, this substance cannot be regarded as carminate of ammonia.

In order to ascertain the nature of this alteration, Herr Schutzenberger has examined carminic acid and the substances resulting from the action of ammonia, comparatively, and finds that the latter is the amide of carminic acid. The analysis of carminic acid, prepared in various ways, showed that its composition varies: but that all the results may be represented by the same formula, except as regards the amount of oxygen. Hence he infers that there are at least two degrees of oxidation of this substance corresponding to $C_{18}\,H_8\,O_{10}$, and $C_{18}\,H_8\,O_{14}$. By heating a mixture of carminate of soda and iodide of ethyl in a close tube to 125° C., the ether of this acid was obtained in the state of a red substance soluble in alcohol and insoluble in water.

It was also observed that nascent hydrogen completely decolorizes a solution of carminic acid, and that the colour returns again by exposure to the air in the same manner as with indigo.*

Use of Cobalt Compounds in making Porcelain.—The use of powdered oxide of cobalt for counteracting the yellow colour of the finer kinds of porcelain, has the disadvantage of producing spots. M. Carré,† of Sèvres, has, therefore, used a solution of chloride, sulphate, nitrate, or other salt of cobalt, and found that it produces the desired effect without the inconveniences attendant upon the use of the oxide of cobalt. The solution of cobalt salt is thoroughly mixed with the porcelain mass, or with the glaze, and during the baking the salt is decomposed, leaving oxide of cobalt uniformly disseminated. The colour thus produced is bright and clear, and its intensity depends on the proportion of cobalt salt employed, according as it is desired merely to neutralize the yellow tinge, or to colour the porcelain.

Pieces may also be coloured by immersing them in a solution of some cobalt salt before the baking; and by covering portions of the surface with varnish, the coloration may be more partial. This method of colouring may be adopted with any metallic salts corresponding to metallic oxides that have hitherto been used for colouring porcelain.

Organic Acid in Manure.—M. Paul Thenard‡ has observed, that when fermented manure is washed, the brown coloured liquid obtained contains a nitrogenous acid combined with ammonia. Addition of acids precipitates this acid, which is insoluble in water. It then appears as a gelatinous bulky mass, and when purified was found to have a composition corresponding to C_{30}, H_{15}, NO_{11}. . . . M. Thenard gives it the name of fumic acid. The ammonia salt of this acid precipitates alumina and peroxides of iron, forming with them a kind of lake. Lime is also precipitated by it from a solution of bicarbonate of lime in carbonic acid water.

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* *Comptes Rendus*, January, 1858.
† Armengaud's *Genie Industriel.*
‡ *Comptes Rendus*

Products of the Action of Heat upon Sugar and Starch.—The substance produced by heating cane sugar, and known by the name of caramel, has been minutely investigated by M. A. Gélis.* The caramel obtained by means of a moderate heat consists chiefly of a substance soluble in alcohol, and having a composition corresponding to C_{12} H_8, O_8, HO. This M. Gélis calls caramelan. At a higher temperature another substance is produced, which is insoluble in alcohol but soluble in water, and has a composition corresponding to C_{36}, H_{24}, O_{24}, HO; this is called caramelen. A third substance is also produced that is insoluble both in water and alcohol, and has a composition corresponding to C_{96}, H_{50}, O_{50}, QHO; this is called caramelin, and it may be obtained in three distinct modifications:—1, soluble in water; 2, insoluble in water, but soluble in other solvents; and 3, totally insoluble. It is obtained in the first state by boiling the insoluble caramelin with water; the dark coloured solutions so obtained may be concentrated, a portion of the caramelin being converted meanwhile into the insoluble modification, and separating as a film on the surface of the solution. By adding alcohol to the solution the caramelin is almost entirely converted into the insoluble modification and precipitated. The solution of caramelin in alkaline liquids give precipitates with acid like the solution of alkaline ulmates. At the moment of precipitation the caramelin is in the modification 2; but after standing some days in a moist state, or by drying, it passes into the modification 3. Consequently caramelin can be prepared only from fresh caramel, and for the same reason solutions of caramel gradually deposit a brown sediment when kept.

All these substances are produced from cane sugar by separation of water. Grape sugar yields products that are similar to, but not identical with, those from cane sugar.

The alteration that starch undergoes when heated, was first observed by Vanquelin in 1811, and the products of this action are under the names of leicome and dextrin, articles of commerce. In order to study the action of heat on starch, M. Gélis operated upon it in a flat-bottomed veesel heated at one side. At first water was given off and dextrin produced, and by continuing the heat this was converted into a dark coloured, almost melted mass. This matter treated with water left a residue of charred starch, and the solution, when evaporated, left a light spongy friable substance, unalterable by exposure to the air, very soluble in water, and of a brown colour. This M. Gélis calls pyrodextrin. Any admixture of dextrin may be easily separated by precipitation with alcohol. This substance exists in the crust of bread, in high-dried malt, roasted coffee, &c.

The new Metals in the Magnetic Iron-Ore of Sweden.—Professor Ullgren† states that, in examining a specimen of iron-ore from Westerby, near Askersund, which had been found to cause great deterioration of the iron, even when it is used only in small proportions in the smelting, he has found what he believes to bestow new elementary substances of a metallic nature, one being electro positive and the other electro negative. The former presents the following characters:—It is precipitated, together with iron and a small quantity of zinc, by sulphuretted hydrogen from the solution of the ore mixed with acetate of soda. The iron and zinc may be separated from the partially dried precipitate by means of dilute hydrochlorine and nitric acids used successively. The residue ignited in the air and thus melted with carbonate of soda, yields a greyish yellow substance, which, when heated to redness in hydrogen, gives a black powder, that burns in the air to a greyish-yellow powder again. The black powder obtained by heating in hydrogen is very slightly acted upon by nitric acid; it is more easily dissolved by nitro-hydrochloric acid; the solution gives with alkalin a bright yellowish-brown flocculent precipitate, and with ferrocyanide of potassium a blue or green precipitate. When melted with phosphorus salt, this black powder gives a colourless head that becomes opaline in the inner blowpipe flame. It is not at all acted on by the magnet.

The electro negative metal is precipitated by sulphuretted hydrogen from an acid solution; the colour of the precipitate is brown, it is soluble in ammonia, and in

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* *Comptes Rendus*, xiv., 540.

† *Annalen der Chemie und Pharmacie*, civ., 336.

sulphide of ammonium with brown colour. The solution in nitro hydrochloric acid gradually deposits on evaporation a brownish-yellow substance, which gives a colourless head when melted with phosphorus salt, but no metal when melted with soda upon charcoal.

PHARMACY IN BELGIUM.*

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—I must claim your indulgence to permit me to reply to the highly amusing disquisition upon the respective merits of French and English Pharmacy, which emanated from the fertile pen of Mr. Ince, and appeared in the *Pharmaceutical Journal* for June last. I do not wish to detract from its merit, save with this exception :—One of his interesting comparisons is drawn from the city of Brussels, and that comparison is too invidious by far to escape notice, and is likely to convey a false impression to those English readers who, unlike himself, have not received the advantage of a Continental education. He presumes that it would require an ingenious man to detect a similarity between our Rue Royale and the chief street in the heart of the city of London ! Now, although not pretending to possess more ingenuity than usually pertains to one of my calling, allow me to inform him that the comparison he has taken is as odious as though, in place of the Rue Royale at Brussels, he had taken the thoroughfare leading from Piccadilly, through Grosvenor Place, into Pimlico. The Rue Royale runs parallel with the park from the palace, and may be considered to form the extreme limit of our west end ; its occupants being the "Belgravians" of Brussels.

Animated with such a Columbus-like spirit of discovery as he professed, I wonder that the supineness of an English man of business should have prevented him from seeking the real business thoroughfares of the capital of Belgium, where the trade is neither confined to a few ladies nor an occasional tourist. Let us then start from the King's Palace once more, still possessing an inquiring turn of mind ; but let us take another direction through this "miniature of Paris." Leaving then the Rue Royale, Palace, Park, Ministères, Place Royale, and crowded hotels in the rear, we will take the direction of those streets which lead into the city, and where every intelligent traveller instinctively finds his way. First and foremost is the Montagne de la Cour, certainly by no means a rival with Regent Street, as some oversanguine "tourist's companion" has asserted, but withal an elegant and fashionable promenade. Then follow the Rue de la Madeleine, Marché aux Herbes, Rue de la Montagne, Rue des Tripiers, de l'Ecuyer, &c. &c. ; and I would observe of the "Galeries du Roi et de la Reine," that with them the Arcades of London can bear no comparison. Then there is the market-place in front of the magnificent and celebrated Hôtel de Ville, where,

> "Within a windowed niche of that high wall,
> Sat Brunswick's fated chieftain ;"

and where, on the eve of Waterloo, were assembled, at the Duchess of Richmond's ball, the flower of the chivalry of Europe. After traversing these resorts, the

* In order to make this letter intelligible, it is necessary to quote the passage alluded to in Mr. Ince's paper:—

"Animated with a Columbus spirit of discovery, I once entered a Brussels Pharmacy—time twelve o'clock mid-day, weather splendid, London business thermometer at 112° Fahrenheit; but where, and oh where, was my Belgian Chemist gone? There stood the shop, with its great jars of Pâte de Réglisse, Pâte de Jujûbe, and Pastilles de Guimauve, useful but not strong remedies : there stood the rows of extract pots, blue Chinaware, with bright gold labels, with the last glow of the Lowther Arcade upon them: there stood glasses with rolls of issue-peas and saccharated capsules : there stood a miniature case filled with Albespeyre's paper, Camphor Cigarettes, and Blanc de Perle. These were the only things which did stand, for in a sort of back parlour (land appeared in view) there sat the master—sat and smoked complacently. By degrees it slowly dawned upon him that there *was* a customer, and he emerged, pipe in hand, looking something between a bandit and a Plymouth brother. The small retail order was duly executed, and he went back to his resting-place, while I returned to mine."

benighted tourist may shake off his apathy, and disabuse himself of many innocent prejudices so peculiar to our countrymen.

In fact, it is no less amusing than surprising to see the wonderful amount of continental lore John Bull suddenly acquires the moment that he doffs the sober habiliments of his forefathers for the imaginary *indispensables* of a tourist; and when he returns to the bosom of his family, with a frontispiece at once the admiration of incipient Wellingtons and Havelocks, and the intense fright of his sensible little "Anna-Marias," his patriotic soul is then ready to burst with enthusiasm, as he dilates upon the "curious apathetic, easy manner of foreigners," who, unlike himself, he complains, have the time to call their souls their own.

It is not difficult to select the Pharmacien your worthy correspondent disturbed from the pleasures of the seductive weed, and who was regaling himself so cosily in the little back parlour, for, in the Rue Royale, Pharmaciens, like other distinguished grubbers in that distinguished locality, are few and far between. One, the "Pharmacien du Roi;" his otherwise sleepy head has nevertheless managed to maintain a Belgian connexion about his pharmacy, and a complacent smile of satisfaction lurks in every corner of his portly frame. Well, it could not be he; but, nevertheless, as there are Huggins and Muggins in every *highly respectable* family, so we meet with "beggarly apothecaries" among our society, and Brussels contains perhaps even more than an average number of them; but at the same time, the majority are men whose habits and acquirements demand a more impartial acknowledgment, and that they ask from the generous editor of the *Pharmaceutical Journal*, and for which customary urbanity he is so distinguished.

In conclusion, allow me to suggest that a tour in the direction I have named would have made Mr. Ince acquainted with pharmacies where the business of the day commences at six o'clock in the morning, and does not cease until ten o'clock at night. The curfew hour of the Belgian gasmen then brings relief from the fatigues of his duties alike to the "pharmacien," his "elèves," his "apprentis," and his "hommes de peine."

Apologising for thus intruding upon your valuable space,

I am, Sir, your very obedient Servant,

Brussels, July 17, 1858. AN ENGLISH ASSISTANT AT BRUSSELS.

LARCH BARK.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—I have read with much interest a short article in your Journal for July, on the therapeutic virtues of larch bark, quoted from the *Dublin Hospital Gazette*. It would appear that it has been used by several medical men in Dublin with considerable success; and as I have had my attention directed to it already, it may not be out of place to notify to your readers my slight experience of its use, since its introduction here, in the form of the tincture.

This preparation is similar to that described in your journal, having a dark carmine colour and a powerful astringent action.

I have now prescribed it in several cases of chronic mucous discharges with powerful results, checking likewise hæmorrhages from several mucous canals in the body, especially the genito-urinary, for which it may be successfully prescribed, both locally (say equal parts of tincture and water) and also internally, in such cases as hæmaturia. I consider it may be well to continue our investigations into the therapeutical actions of the tincture of larch.

I am, your obedient Servant,

1, *Melville Street, Edinburgh, July*, 1858. JAMES YOUNG, M.D.

DR. LETHEBY ON THE STATE OF THE THAMES.

THE high temperature of the last month, together with the continued absence of rain, have caused the Thames to assume an appearance and to undergo a change which has never before been witnessed. I have been engaged for the last fortnight in making daily examinations of Thames water at different points between Ted-

dington Lock and Greenwich, and the results of those examinations show that the river is charged, to an unusual degree, with sea salt and organic matter. At high tide, when the water from Teddington Lock to Hammersmith contained only about 19 grains of saline matter in the gallon, that which has flowed up to Wandsworth contained rather more than 30; while the quantity at Chelsea is about 55 grains; Vauxhall, 58; at Westminster, 69; at Hungerford, 79; at Blackfriars, 103; and at London Bridge, 131. This proves that the oceanic tide in the river has risen as high as Wandsworth, and has thus contaminated the water with the saline and other impurities of the sea. As a rule, the soluble inorganic constituents of the river at high tide at London Bridge do not exceed 45 grains in the gallon, and the organic impurity is not more than 4 grains to the gallon; but during the last fortnight the saline elements have amounted to 131 grains in the gallon, and the organic to 12. Even at Westminster Bridge they have reached to 69 grains per gallon, and the organic matter to 5.6. The proportions at other places at high and low tides are given in the 5th Table of the Appendix, and they show most conclusively that the sea water has risen to a great height along the course of the river. Now, experience has amply proved that whenever such a mixture as this occurs at a high temperature, putrefaction of a most offensive character is set up. In the present case the sewage and the organic matter and sulphates of the sea water have acted on each other, and have produced the state of things with which for the last fortnight we have been so familiar. The inky appearance of the river has been caused by the fixation of the sulphuretted hydrogen by the iron of the clay. This has been the salvation of our lives; for, offensive as has been the vapour evolved from the water, it is as nothing in comparison with what it would have been if the much abused clay from the lower shores of the river had not fixed the miasm in a solid involatile form.

As it is, however, the gases evolved from the water amount to about 15 cubic inches per gallon. They consist chiefly of carbonic acid, with ammonia, nitrogen, and a trace of oxygen. They do not contain sulphuretted hydrogen, but they contain a stinking vapour which is in the highest degree offensive, and which, when inhaled, produces headache, giddiness, and nausea. The water at mid-stream is charged with the higher forms of animal and vegetable infusorial life; but that at the shore is so lethal in its qualities, that nothing exists in it but the lowest species of fungi with monads and vibriones, which are the simplest of animal forms.—*Dr. Letheby's Quarterly Report of the Sanitary Condition of the City of London*, June 26, 1858.

ACTION TO RECOVER COMPENSATION FOR THE SUPPLY OF CHLORIDE OF ZINC FOR FLUID MAGNESIA.

Second Court, Guildhall.

(Before Mr. Justice Hill and Special Juries.)

RICHARDS *v.* COCKING.

Mr. Macaulay and Mr. Prideaux were counsel for the plaintiff, and Mr. Serjeant Thomas and Mr. Hawkins appeared for the defendant.

The action was brought by a gentleman of "fair means," residing with his mother and brother in Somersetshire, to recover compensation of a chemist in Great Portland Street for having administered to him a noxious and deleterious drug in lieu of fluid magnesia. The circumstances of the case are explained in the following evidence:—

Mr. William Richards, the plaintiff, said he resided at Alcombe, in Somersetshire, but on the 20th of March he came to London, and drove direct to the Portland Hotel, Great Portland Street. He ordered his dinner, and had a very good and hearty meal. Having had veal cutlets, he experienced a little heartburn, and to relieve it he went to the defendant's, a chemist's shop, in Great Portland Street, and asked for an ounce and a half of fluid magnesia. Mr. Cocking went into a back room, obtained a wine-glass, returned to the shop, took down a bottle, after selecting it, and filled the glass. Witness took up the glass, raised it to his lips, filled his mouth as full as he could, and immediately discovered that instead of magnesia it was some caustic, burning fluid. He went towards the door and spat out all that had not by the overflowing of his mouth gone down his throat. He

went back, took up the bottle, read the label, "Sir W. Burnett's Disinfecting Fluid," and said to Mr. Cocking, "See what you've given me. Had you not better give me an emetic?" He said, "No." Plaintiff said, "Are you sure it will not hurt me?" He said, "No, for you have not swallowed any." Plaintiff said, "I have, for I feel it burning in my throat and stomach." Cocking gave him some water to drink, but he could not swallow. Plaintiff said, "I am sick and in pain; will you allow me to go into that back room and sit down?" He said, "No, I can't; I'm at tea." Plaintiff then left. In crossing the road he vomited, and again before reaching his hotel. When he got to his room he commenced ringing the bell as hard as he could. The chambermaid and waiter came, and Mr. Clover, a surgeon, was sent for. He flung himself upon the bed, and remained there until on vomiting again he fell off upon the floor. He could not raise himself, and was picked up and put on the bed by the waiter. He was completely prostrated, and vomited several times after being placed on the bed. When the doctor came he could not speak to him at first, but got better and told him what had occurred. He remained under Mr. Clover's care about a fortnight, suffering pain in the stomach at intervals. He was perfectly well acquainted with the taste of Epsom salts, for he took two doses last week (laughter), and what Mr. Cocking gave him was not Epsom salts. He had been in the habit of using Dinneford's fluid magnesia and Burnett's disinfecting fluid. They were sold in bottles so similar that a person might readily mistake one for the other. He had been put to an expense of £20.

Cross-examined.—He should not have brought the action if the defendant had expressed the least regret. He sent a lawyer's letter on the 29th of March, and issued a writ on the 1st of April, without personally making any attempt to see Mr. Cocking.

The chambermaid and waiter gave confirmatory evidence.

Mr. Joseph Thomas Clover, surgeon, of Mortimer Street, Cavendish Square, who had known Mr. Richards for two or three years, and was called to attend him on the evening of the 20th of March, stated that Mr. Richards was in a state of collapse, with pulse feeble, vomiting, and general exhaustion. His throat was inflamed, and he complained of pain in the throat and stomach. The symptoms indicated that he had swallowed some corrosive poisonous substance, such as Burnett's fluid, which contained a large quantity of chloride of zinc. Witness thought him in a dangerous condition for some hours, and was so anxious that he called in Dr. Jenner. Some one stayed up with Mr. Richards all night, and witness attended him a fortnight afterwards, during which Mr. Richards complained more or less of pain, but got better. The symptoms could not have been produced by Epsom salts, and Epsom salts could not be mistaken by any one in taste for Burnett's fluid. An emetic would have been proper after Mr. Richards had taken the fluid. Witness went to Mr. Cocking's, and the defendant denied having given Burnett's fluid by mistake for fluid magnesia. He went again in company with a friend of Mr. Richards, and Mr. Cocking said it was not Burnett's fluid, but Epsom salts, and it could not hurt the gentleman, because he was nervous and spat it all out again. Mr. Cocking also said he did not keep fluid magnesia nor Burnett's solution.

Dr. Jenner gave confirmatory evidence of the symptoms of Mr. Richards, indicating the reception into the stomach of some irritant, such as Burnett's disinfecting fluid. Burnett's preparation contained a large quantity of chloride of zinc, which was a strong metallic poison. He should consider any one made a great mistake who gave him Epsom salts or sulphate of magnesia instead of fluid magnesia. They were quite different things, and used for different purposes. The symptoms could not have been produced by sal volatile or Epsom salts.

Dr. Francis Cornelius Webb, of Great Coram Street, had had a case of poisoning by Burnett's disinfecting fluid, and Mr. Richards's symptoms were the same as those of his patient. Every case would be fatal if vomiting did not take place immediately, and therefore an emetic was proper to be administered. Sulphate of magnesia was very different from fluid magnesia, and used for different purposes.

Lieutenant Whitehill, a friend of Mr. Richards, proved the serious nature of that gentleman's illness, inasmuch as it prevented his moving in bed without assistance during the night of the 20th of March.

Mr. Serjeant Thomas addressed the jury for the defendant.

At the conclusion of the learned counsel's address, the further hearing of the case was adjourned to the following morning, when

Thomas Cocking was called.—I am the defendant in this case. I have acted as a chemist and druggist in the same house for thirty years. The plaintiff came into my shop and asked for some cooling medicine. I gave him a solution of magnesia. He asked for fluid magnesia. I went into the parlour for a wine-glass. I took down a bottle from the shelf, which contained a solution of Epsom salts—that is, sulphate of magnesia. The plaintiff took up the glass and put it to his lips. He then spat out what he had taken. He then put the glass back on the counter. The glass was still nearly full. He said it was very nasty, and asked for a glass of water, which I gave him, and he washed out his mouth three times. He did not say that his mouth was burning. I told the plaintiff it was a solution of Epsom salts that I had given him. The bottle was still on the counter. Having washed out his mouth, he asked for sal volatile. I gave him some. He drank a portion. He asked what there was to pay. I said, "Nothing," as he had not drank it. If he had taken it I should have charged him 4*d.* or 6*d.* I gave him the sal volatile in water in a tumbler. He walked away after I had told him he had nothing to pay. He did not say he was sick, nor that I had given him poison. He did not read on the bottle, "Burnett's Disinfecting Fluid." I had not a bottle with such a label in my house, nor have I ever had any of that fluid in my shop. The plaintiff said something about an emetic, but I told him there was no occasion for it. I do not recollect that he said anything about Burnett's fluid. He took up the bottle, and asked if that was it. I said "Yes." It was a glass bottle, and there was the ordinary label upon it of "Epsom Salts." He asked me if I had given him that. I said "Yes," and he went away. I think he asked to be allowed to go into the parlour, but I told him there was no occasion. I had antidotes for poison in my shop. If he had taken Burnett's fluid I should have given him diluted sulphuric acid; that is an antidote. There did not appear to me to be anything the matter with the plaintiff when he went away. I watched him for a minute or so. He walked straight and well. A gentleman called in the evening and asked if there had been any mistake. I denied it, and he went away. Three gentlemen called some time afterwards. One of them asked if I had any chlorides, any Burnett's fluid, and he asked me to show him all the bottles I had. I showed him them. They were chloride of zinc, chloride of lime, and soda. I kept the chloride of zinc in a different part of the shop to that in which the Epsom salts were kept. It was impossible to mistake the two bottles. I showed him the Epsom salts bottle; he smiled, and I told him it was impossible to make a mistake. He did not ask me to go and see the plaintiff. I apologized to them, and said I was sorry they should think there was any mistake. I had before apologized to Mr. Richards because he did not like his medicine. The gentlemen who called did not describe the plaintiff's symptoms; they merely said he was poorly. I heard nothing more until I received an attorney's letter, and two days after that the writ was served. I then went to the Portland Hotel and saw Mr. Nelson, the landlord, but was told Mr. Richards was not there.

Cross-examined.—I called there on the 2nd or 3rd of April. I was served with a subpœna on the 30th of June. The plaintiff did not come and point me out. On the 20th of March he asked me for a cooling medicine, leaving it to me to give him what I pleased. He did not say what was the matter with him. He asked for a cooling medicine first, or a little fluid magnesia. I did not keep fluid magnesia. Epsom salts is a purgative. Fluid magnesia is a specific for heartburn. I keep chloride of zinc. I had no assistant. There is a large coat of arms over my door, and on it is "By appointment." I bought it and put it up. I am also a wholesale chemist. I never was asked for any of Burnett's fluid.

Mr. Thompson, surgeon to the Marylebone Dispensary.—Sal volatile, in certain quantities, is a poison. I believe that under the circumstances described by the plaintiff sal volatile might have produced a certain amount of nausea. I and Dr. Taylor have analyzed the contents of a bottle which the defendant handed to me. It contained a solution of sulphate of magnesia, which is Epsom salts. Magnesia is in itself nearly insoluble. Dinneford's fluid magnesia is sold under that name. If a person asked for a cooling mixture, a chemist would be justified in giving him a solution of Epsom salts. If a person asked for a cooling mixture, or fluid magnesia, it

would be an undetermined matter. The person should be asked what he particularly required. The sulphate of magnesia is an aperient. The fluid the defendant has given me is innocuous. Burnett's fluid has been mistaken for pale ale. It could not be mistaken for Epsom salts ; it is much heavier.

Cross-examined.—I have seen Burnett's fluid clear. I have known chloride of zinc taken by mistake for pale ale. Taking chloride of zinc might cause vomiting, burning pain, and indisposition for some weeks, and there would be great prostration of strength. It would entirely depend upon the quantity taken. I have never known such symptoms follow a dose of Epsom salts. I am not prepared to say it would be absurd to suppose so.

Re-examined.—I have known instances of pale ale producing very serious vomiting when taken upon an empty stomach. A strong solution of sal volatile would produce vomiting.

J. Z. Laurence.—I am a Fellow of the Royal College of Surgeons. I know this fluid. I have not seen any case arising from taking that fluid. I know nothing about it but what I have read. I agree with Mr. Thompson. I think Mr. Cocking might have acted *bonâ fide*. Vomiting might be produced from the nausea of salts in the mouth.

Mr. Cocking recalled.—The bottle I gave Mr. Taylor was that from which I took the glass I gave to the plaintiff.

Wood.—I was in the employ of the defendant for six months. He never kept Burnett's Disinfecting Fluid.

William Childs.—I served my time with the defendant. He had not a bottle of Burnett's fluid in his shop. I left him in 1853.

William Bateman.—I am in the employ of Burnett. The defendant has never been supplied with any of this fluid. He has always refused to have any.

Cross-examined.—Persons keep chloride of zinc, but that is three times as dear as our preparation. We have never altered the shape of our bottles. I don't think Dinneford's magnesia bottles quite resemble ours.

By the Jury.—We supply wholesale chemists, who may supply the retailers.

Mr. Serjeant Thomas summed up his evidence, and

Mr. Macaulay addressed the jury in reply upon the whole case.

The learned Judge, in summing up, said the plaintiff alleged that he went into the defendant's shop and applied for an innocent medicine—fluid magnesia—and that the defendant negligently gave him an irritant poison. The plaintiff secondly said that he applied for an innocent medicine, and that the defendant gave him a medicine which, by his conduct, he warranted to be what he asked for, but instead of that he had given him an irritant poison. The jury would, therefore, have to consider what it was the plaintiff had asked for, and what it was the defendant had supplied. If they were of opinion that the defendant did not supply what the plaintiff had applied for, but instead of that had given him a noxious irritant poison, the plaintiff would be entitled to a verdict. If the defendant deserved to have a verdict against him, they would give it regardless of the consequences.

The jury retired, and on coming again into court returned a verdict for the plaintiff—Damages, £75.

THE VALUE OF PRESCRIPTIONS.

In a singular action, Fray *v.* Voules, tried in the Queen's Bench on Monday, July 5th, the various counts at issue were gradually narrowed to one of compensation for detention of some physicians' prescriptions given to the plaintiff by the late Sir James Anderson, who had attended her for several years, and on which she set a very high value indeed. It was suggested for the defence that the plaintiff was not entitled to more than would obtain her the advice of a respectable physician, and not such as would carry costs. Lord Campbell thought it would not be difficult to get copies of them where they had been made up ; but the plaintiff was entitled to recover their value, and that value the jury would give her and no more. Damages —five guineas, which carries costs.—*Lancet*, July 10th.

SALE OF POISONS BILL.

House of Lords, Monday, July 5, 1858.

On the report of this Bill—

The Earl of Wicklow said he observed in the Bill a clause which was exceedingly offensive in his eyes. It was clause 19, which enacted that "this Act shall extend only to England." Now if, as he believed, the measure would be of great public benefit, and was much required, he could not see why its provisions should not extend to Ireland. He regarded with much suspicion and dislike this kind of exceptional legislation, which defrauded Ireland of the benefits of good measures framed for the rest of the empire. He trusted that the noble Earl at the head of the Government would consider the propriety of extending the operation of the Bill to Ireland.

The Earl of Derby could not undertake to say offhand whether the Bill was applicable to Ireland or not. The Bill was introduced in consequence of the recommendations of the Select Committee of their Lordships' House which sat last year. They went into evidence which showed the necessity of some check being imposed by the Legislature upon the unrestricted sale of poisons, and the present Bill was the result of their inquiries. He agreed with the Committee that some such Bill was greatly needed, and he thought that the measure now before their Lordships, with some amendments, was likely to carry out the desired object. He had himself some amendments to move, but they were few and unimportant. Clause 9 enacted that three Examiners should be appointed to grant licences and examine persons desirous of obtaining licences to vend poisons under the Act. These Examiners were to be appointed severally by the College of Physicians of London, the Society of Apothecaries of London, and the Pharmaceutical Society of Great Britain. By the clause as it now stood, each Examiner was to hold office for such term as the body by which he was appointed should think fit to direct. As, however, the powers to be exercised by the Examiners were absolute, and were of considerable importance, extending to the entry and search of any surgery, shop, or place in which drugs were sold by retail, he thought that the nomination of the Examiners ought to be made subject to the approval of one of her Majesty's Principal Secretaries of State, and that the Secretary of State should have the power of dismissing any Examiner upon due cause being shown. He therefore proposed to add the following words:—"Provided always that the Secretary of State may by writing, under his hand, revoke the approval of the appointment of any such Examiner for any cause, to be specified in the instrument of revocation, which may appear to such Secretary of State to render improper the further continuance in office of such Examiner, and thereupon the appointment shall be determined." Clause 16, regulating the keeping of poisons by members of the Medical Profession and Pharmaceutical Chemists, enacted that they, as well as other persons who kept for sale by retail any poison, should "keep all such poisons separated from all other drugs and medicines, and distinctly labelled with their names. It was thought that the separation of poisons from other drugs ought to be rendered still more stringent and distinct, and that poisons should be kept in jars or bottles distinguishable in colour from those in which other drugs were kept. He proposed, therefore, to amend the latter part of the clause, which would then read as follows:—"Every person who keeps for sale by retail any poison, and every Apothecary, Surgeon-Apothecary, or other member of the Medical Profession, or Pharmaceutical Chemist, and every officer of any hospital, infirmary, or dispensary, who has under his custody any poison, shall keep all such poisons together, and separated from all other drugs and medicines, and distinctly labelled with their names; and all jars and bottles in which any such poisons are kept by any such person, shall be distinguished in colour from the jars and bottles in which any other drugs or medicines are kept by him." By this amendment he trusted that accidents arising from the substitution of poisons for other drugs would be rendered more unfrequent. Persons failing to comply with these provisions, in respect to poisons kept by them or under their custody, would be liable to the penalties set forth in the 18th clause. If their Lordships would adopt these amendments, the Bill would be printed as amended, and their Lordships would have an opportunity of considering them before next Thursday, when the Bill could be read a third time.

Lord Talbot de Malahide said he had given notice of his intention to propose certain amendments with respect to the selection of Examiners under the Bill. The

Pharmaceutical Society of Great Britain were obviously the body best qualified to superintend the administration of a measure principally affecting the Pharmaceutical Chemists of the kingdom, and they objected to the constitution of the Board of Examiners, in which they were to be united with the Apothecaries. On a former occasion a similar arrangement was proposed in a Bill introduced by a member of the other House, and it gave rise to so much opposition, that it was mainly the cause of the rejection of the Bill. The Apothecaries in England had become Medical Practitioners, and were a body quite distinct from the Chemists. In Ireland the Apothecaries had retained their proper and original functions as dispensers of medicine; the sale of poisons was confined to them, and as they were qualified, having passed a regular examination, there was not the same necessity for a Sale of Poisons Bill in Ireland as in England, where the sale of poisons was under no regulation whatever. The Pharmaceutical Society had rendered great services to medicine and chemistry, and had done much to raise the standard of the profession. He now gave notice that on the third reading of the Bill he should move amendments which would more distinctly recognise the Pharmaceutical Society, adopting its Board of Examiners, with the addition of a physician. He trusted that these amendments would receive the support of the noble Earl opposite (the Earl of Derby), to whom the country owed a deep debt of gratitude for having taken up this question.

Lord Portman thought the proposed amendments entitled to consideration. The Bill, with some such improvements, was likely to be a useful measure.

Lord Wensleydale made a few remarks to a similar effect.

Earl Granville did not think that the noble Earl at the head of the Government would be expected to give any opinion then upon the amendments of his noble friend (Lord Talbot de Malahide), but they appeared to him to deserve the adoption of their Lordships, and he trusted that on the third reading of the Bill, the noble Earl at the head of the Government would be prepared to agree to them. He had at one time entertained some doubts as to the propriety of entrusting the Pharmaceutical Society with so much power and influence; upon further inquiry, however, he had ascertained that the Society had done much service to the public by raising the status and education of the Chemists, and was entitled to consideration. He thought in any law that might be passed care should be taken not to injure the Society.

The Earl of Hardwicke confessed he thought that the best safeguard against the improper sale of poisons would be to confide the sale of poisons to respectable and trustworthy persons. If certain poisons were named in the Bill as those only which should not be sold except under special circumstances and with special precautions, he feared the result would be that the Act would be read literally, and that many other drugs which were almost as deadly as prussic acid or strychnine would be freely sold without any precautions. There were many poisonous substances which the Bill did not specify, and he was afraid it would be extremely difficult to legislate with effect in the matter, except with reference to the qualifications of the vendors.

The Earl of Derby said that his present impression was that it would be better to allow the Bill to remain as it now stood. He saw no reason why the Pharmaceutical Society should have the exclusive right to form the Board of Examiners under this Bill. He would admit that the Pharmaceutical Society was a useful body—that it had done much to advance the study of medicine and the status of its members as a profession, and any suggestions from such a body would deserve and should receive his best consideration. There was one suggestion of the Society to which he could not accede: it was proposed that all persons in business as Chemists and Druggists at the date of the Act should have a licence to sell poisons for the rest of their lives. To this he decidedly objected, and intended the licence to be in force for five years, after which an examination should be required, and those who could not pass should discontinue the sale of poisons. He would consider the amendments proposed by the noble Lord between that day and the day fixed for the third reading of the Bill.

The amendments proposed by the Earl of Derby were then agreed to.

The Bill was then ordered to be printed as amended, and to be read a third time on Thursday.

Thursday, July 8, the Bill was read the third time and passed.

House of Commons, Monday, July 12.

The Bill was read the first time, and the second reading was appointed for Thursday, the 15th, but on Wednesday Mr. Walpole put it off until Monday, the 19th.

On Friday, July 16th, Mr. Walpole stated in the House that communications had

been sent to him from every quarter, almost from every village, stating that the Chemists had serious objections to the Sale of Poisons Bill, and although he did not quite agree in all of them, yet, as he thought that the Bill required great amendment, he proposed not to proceed with it this session. The order for the third reading was therefore read for the purpose of being discharged.

SALE OF POISONS BILL.

MEETING IN LIVERPOOL.

In consequence of the Sale of Poisons Bill having passed the House of Lords without any of the amendments suggested by the Poisons Committee of the Liverpool Chemists' Association, it was decided to call a meeting of all the Chemists and Druggists in Liverpool, to take such steps as might appear desirable.

Dr. Edwards, as local Secretary of the Pharmaceutical Society, also decided upon convening a meeting of the Pharmaceutical Chemists for the same purpose, and it was arranged that the meeting of both parties should be held at the same time and place.

A public meeting was accordingly held in the Royal Institution, on 13th July, which was numerously attended, and resolutions adopted to the following effect:—

That petitions be immediately sent up to the House of Commons from the Pharmaceutical Chemists, and also a petition from the Chemists and Druggists of Liverpool, against the Bill, and that two gentlemen should be deputed to proceed to London to support the same. Dr. Edwards was chosen on the part of the Pharmaceutical Chemists, and Mr. Bretten on behalf of the Chemists and Druggists.

At a meeting of the Council of the Chemists' Association, held also on the 13th July, a petition to the House of Commons against the Bill was adopted, and Mr. Abraham was deputed to proceed to London to support it.

These gentlemen left Liverpool the same evening, with the petitions numerously signed; and on their arrival in London the petitions were severally confided to Messrs. Brown, Horsfall, and Ewart, who presented them to the House of Commons, and also courteously met the deputation, entered into a careful consideration of the merits of the case, sympathised with the petitioners, and opened a communication on their behalf with the Home Secretary.

MEETING AT OXFORD.

At a meeting of the Pharmaceutical Chemists of this city, held at the Committee-room, Town Hall, by permission of the Mayor, Mr. W. Walsh in the chair, it was in the first place unanimously resolved,

1. That a petition be forthwith prepared against the obnoxious clauses of the Sale of Poisons Bill, and placed in the hands of both the city Members;

2. That a deputation from this meeting wait on Mr. Langston, to request that gentleman to give his most strenuous opposition to the objectionable clauses of the Bill;

3. That the Chairman be requested, as a deputation, to proceed to town and procure an interview with Mr. Cardwell, the other Member, to explain to him the objectionable clauses of the Bill, to present the petition, and request his interest and support to the prayer of the same when brought before the House of Commons.

A form of petition was adopted and numerously signed.

[Meetings were held in many other places, of which our space does not admit of special reports. The above are unavoidably curtailed; the substance of the discussion being in almost all cases to a similar effect, a repetition would be superfluous.]

THE INFLUENCE OF PETITIONS IN THE HOUSE OF COMMONS.

There is a popular error that, except in rare instances, petitions are very little regarded, and that, after being read, they are thrown under the table, and thought no more about. This may be true respecting those on unimportant subjects, but on anything occupying public attention the number of petitions is looked upon as a very strong index of the wishes of the represented; and the number presented, the amount of signatures, and often the contents of the documents themselves, are printed in the proceedings of the House. It seems very singular, however, that until lately the public at large had very imperfect means of knowing anything concerning the number or nature of petitions. Thanks, however, to the intelligence and industry of one man, this inconvenience has been for some time past remedied; and now the fact of a petition being presented—its purport, and the name of the

member presenting it—are known in every locality in the United Kingdom where any one of the metropolitan papers is read. To those acquainted with the House it would be needless to say that the person alluded to is Mr. W. Kay, one of the subordinate officers of the library department, and to whose inventive genius is due the process by which everything relative to petitions is now so rapidly made known. Formerly, unless the reporters in the gallery could catch the purport of the petition from the Member's lips (often a difficult, if not an impossible task, particularly if the latter was new in the House), the fact of such being presented was generally left unrecorded. Mr. Kay saw this great disadvantage, and cleverly supplied the remedy. From each Member presenting a petition he obtains a statement of the purport (which must be deposited with one of the clerks at the table, generally contained in a few lines), and then he takes a sufficient number of copies to supply to each of the London papers, whence it is soon copied into others. Although this appears to be a very simple process, it is attended with some trouble, and requires constant regularity and despatch on the part of Mr. Kay, who takes considerable interest in the success of his plan, from which, however, he has hitherto derived but little if any personal advantage.

Several correspondents, not having seen their petitions noticed in the papers, have written to us to inquire the cause. The above statement will explain it. In the cases which came under our notice the petitions were duly presented, but the members omitted to notify the fact. We have not thought it necessary to give a detailed report of the petitions which were presented, as this would not convey a correct idea as to the extent of the opposition, the Bill having been prematurely withdrawn and many petitions too late, others not completed, the contest being over.

EXCLUSION OF QUACK MEDICINES FROM RUSSIA.

A NOTICE from the Board of Trade has appeared in the *Gazette* stating that a despatch has been received from her Majesty's Chargé d'Affaires at St. Petersburg, announcing that the importation of various "medicinal substances" into Russia has been prohibited. Amongst the excluded articles are Morison's Pills and Revalenta Arabica.

POISONING BY CORROSIVE SUBLIMATE.

MISS WHITE, the daughter of the late Town Major White, residing in Chichester Place, Southsea, was poisoned under the following circumstances:—Last year a bottle of corrosive sublimate had been purchased for the purpose of destroying bugs, and after having been used, was placed out of the way in a store closet, where it had remained during the winter. On Tuesday, July 6th, the poison was again put into requisition, and left out for further use on the following day. The mother of Miss White, however, placed it out of the way in a closet in the bedroom in which the two ladies slept. Miss White was in the habit of taking a glass of camphor julep every morning for some complaint with which she was afflicted. On Thursday morning she poured out a glass of the poison, not suspecting for a moment the nature of the mixture, and swallowed sufficient ultimately to destroy life.—*Observer*, July 11th.

SUICIDE BY LAUDANUM.

A LONG inquiry has taken place at the Elephant and Castle Tavern, Camden Town, on view of the body of W. King James Lawson, aged twenty-one, a medical student, who committed suicide by poison. It appeared that the deceased, since entering the medical profession, had been chiefly in the London Hospital. He was of a very delicate constitution, added to which he was subject to epileptic fits. He had lately returned to town from a visit to his family connexions in Devonshire, but the fits continuing he was unable to attend to his studies, and, in consequence, he became in a low, desponding state of mind. On Wednesday, July 14, he left his apartments in Paul Street, Finsbury, and was not heard of again until he was discovered dead in a field contiguous to Hampstead Heath. On his person was found a letter, saying, that owing to his infirmities he intended to commit suicide. A phial half filled with laudanum was found on his person. Mr. Weatherall, surgeon, of Highgate, said death resulted from extravasation of blood upon the brain, the result of the narcotic he had swallowed. Verdict—Temporary Insanity.—*Observer*, July 18th.

ROYAL INSTITUTION.

Weekly Evening Meeting, Friday, June 11, 1858, the Duke of Northumberland, K.G., F.R.S., President, in the Chair.

ON WHEATSTONE'S ELECTRIC TELEGRAPH IN RELATION TO SCIENCE,

Being an argument in favour of the full recognition of Science as a branch of education.

BY PROFESSOR FARADAY, D.C.L., F.R.S.

The development of the applications of physical science in modern times has become so large and so essential to the well-being of man that it may justly be used, as illustrating the true character of pure science, as a department of knowledge, and the claims it may have for consideration by Governments, Universities, and all bodies to whom is confided the fostering care and direction of learning. As a branch of learning, men are beginning to recognize the claim of science to its own particular place ;—for though flowing in channels utterly different in their course and end to those of literature, it conduces not less, as a means of instruction, to the discipline of the mind; whilst it ministers, more or less, to the wants, comforts, and proper pleasure, both mental and bodily, of every individual of every class in life. Until of late years, the education for, and recognition of, it by the bodies which may be considered as giving the general course of all education, have been chiefly directed to it only as it could serve professional services,—namely, those which are remunerated by society; but now the fitness of university degrees in science is under consideration, and many are taking a high view of it, as distinguished from literature, and think that it may well be studied for its own sake, *i.e.* as a proper exercise of the human intelligence, able to bring into action and development all the powers of the mind. As a branch of learning, it has (without reference to its applications) become as extensive and varied as literature; and it has this privilege, that it must ever go on increasing. Thus it becomes a duty to foster, direct, and honour it, as literature is so guided and recognized; and the duty is the more imperative, as we find by the unguided progress of science and the experience it supplies, that of those men who devote themselves to studious education, there are as many whose minds are constitutionally disposed to the studies supplied by it, as there are of others more fitted by inclination and power to pursue literature.

The value of the public recognition of science as a leading branch of education, may be estimated in a very considerable degree by observation of the results of the education which it has obtained incidentally from those who, pursuing it, have educated themselves. Though men may be specially fitted by the nature of their minds for the attainment and advance of literature, science, or the fine arts, all these men, and all others, require first to be educated in that which is known in these respective mental paths; and when they go beyond this preliminary teaching, they require a self-education directed (at least in science) to the highest reasoning power of the mind. Any part of pure science may be selected to show how much this private self-teaching has done, and by that to aid the present movement in favour of the recognition generally of scientific education in an equal degree with that which is literary; but perhaps electricity, as being the portion which has been left most to its own development, and has produced as its results the most enduring marks on the face of the globe, may be referred to. In 1800, Volta discovered the voltaic pile; giving a source and form of electricity before unknown. It was not an accident, but resulted from his own mental self-education: it was, at first, a feeble instrument, giving feeble results; but by the united mental exertions of other men, who educated themselves through the force of thought and experiment, it has been raised up to such a degree of power as to give us light, and heat, and magnetic and chemical action, in states more exalted than those supplied by any other means.

In 1819, Oersted discovered the magnetism of the electric current, and its relation to the magnetic needle; and as an immediate consequence, other men, as Arago and Davy, instructing themselves by the partial laws and action of the bodies concerned, magnetized iron by the current. The results were so feeble at first as to be scarcely visible; but, by the exertion of self-taught men since then, they have been exalted so highly as to give us magnets of a force unimaginable in former times.

In 1831, the induction of electrical currents one by another, and the evolution of electricity from magnets, was observed,—at first in results so small and feeble, that it

required one much instructed in the pursuit, to perceive and lay hold of them ; but these feeble results, taken into the minds of men already partially educated and ever proceeding onwards in their self-education, have been so developed, as to supply sources of electricity independent of the voltaic battery or the electric machine, yet having the power of both combined in a manner and degree which they, neither separate nor together, could ever have given it, and applicable to all the practical electrical purposes of life.

To consider all the departments of electricity fully, would be to lose the argument for its fitness in subserving education in the vastness of its extent ; and it will be better to confine the attention to one application, as the electric telegraph, and even to one small part of that application, in the present case. Thoughts of an electric telegraph came over the minds of those who had been instructed in the nature of electricity as soon as the conduction of that power with extreme swiftness through metals was known, and grew as the knowledge of that branch of science increased. The thought, as realized at the present day, includes a wonderful amount of study and development. As the end in view presented itself more and more distinctly, points at first apparently of no consequence to the knowledge of the science generally, rose into an importance, which obtained for them the most careful culture and examination, and the almost exclusive exercise of minds whose powers of judgment and reasoning had been raised first by general education, and who, in addition, had acquired the special kind of education which the science in its previous state could give. Numerous and important as the points are which have been already recognized, others are continually coming into sight as the great development proceeds, and with a rapidity such as to make us believe that much as there is known to us, the unknown far exceeds it ; and that extensive as is the teaching of method, facts, and law, which can be established at present, an education looking for far greater results should be favoured and preserved.

The results already obtained are so large, as even in money value to be of very great importance ;—as regards their higher influence upon the human mind, especially when that is considered in respect of cultivation, I trust they are, and ever will be, far greater. No intention exists here of comparing one telegraph with another, or of assigning their respective dates, merits, or special uses. Those of Mr. Wheatstone are selected for the visible illustration of a brief argument in favour of a large public recognition of scientific education, because he is a man both of science and practice, and was one of the very earliest in the field, and because certain large steps in the course of his telegraphic life will tell upon the general argument. Without referring to what he had done previously, it may be observed that in 1840 he took out patents for electric telegraphs, which included, amongst other things, the use of the electricity from magnets at the communicator,—the dial face,—the step-by-step motion,—and the electro-magnet at the indicator. At the present time, 1858, he has taken out patents for instruments containing all these points ; but these instruments are so altered and varied in character above the former, that an untaught person could not recognize them. The changes may be considered as the result of education upon the one mind which has been concerned with them, and are to me strong illustrations of the effects which general scientific education may be expected to produce.*

In the first instruments powerful magnets were used, and keepers with heavy coils associated with them. When magnetic electricity was first discovered, the signs were feeble, and the mind of the student was led to increase the results by increasing the force and size of the instruments. When the object was to obtain a current sufficient to give signals through long circuits, large apparatus were employed, but these involved the inconvenience of inertia and momentum; the keeper was not set in motion at once, nor instantly stopped; and, if connected directly with the reading indexes, these circumstances caused an occasional uncertainty of action. Prepared by its previous education, the mind could perceive the disadvantages of these influences, and could proceed to their removal; and now a small magnet is used to send sufficient currents through 12, 20, 50, a hundred, or several hundred miles ; a keeper and helix is associated with it, which the hand can easily put in motion; and the currents are not sent out of the indicating instrument to tell their story, until a key is depressed, and thus irregularity contingent upon first action is removed. A small magnet, ever ready for action and never wasting, can replace the voltaic battery ; if powerful

* The former and the present apparatus were set to work in illustration of the points as they were noticed.

agencies be required, the electro-magnet can be employed without any change in principle or telegraphic practice; and as magneto-electric currents have special advantages over voltaic currents, these are in every case retained. These advantages I consider as the results of scientific education, much of it not tutorial, but of self: but there is a special privilege about the science-branch of education, namely, that what is personal in the first instance immediately becomes an addition to the stock of scientific learning, and passes into the hands of the tutor, to be used by him in the education of others, and enable them in turn to educate themselves. How well may the young man entering upon his studies in electricity be taught by what is past to watch for the smallest signs of action, new or old; to nurse them up by any means until they have gained strength; then to study their laws, to eliminate the essential conditions from the non-essential, and at last, to refine again, until the encumbering matter is as much as possible dismissed, and the power left in its highly developed and most exalted state.

The alterations or successions of currents produced by the movement of the keeper at the communicator, pass along the wire to the indicator at a distance; there each one for itself confers a magnetic condition on a piece of soft iron, and renders it attractive or repulsive of small permanent magnets; and these acting in turn on a propelment, cause the index to pass at will from one letter to another on the dial face. The first electro-magnets, *i. e.* those made by the circulation of an electric current round a piece of soft iron, were weak; they were quickly strengthened, and it was only when they were strong that their laws and actions could be successfully investigated. But now they were required small, yet potential. Then came the teaching of Ohm's law; and it was only by patient study under such teaching that Wheatstone was able so to refine the little electro-magnets at the indicator as that they should be small enough to consist with the fine work there employed, able to do their appointed work when excited in contrary directions by the brief currents flowing from the original common magnet, and unobjectionable in respect of any resistance they might offer to the transit of these tell-tale currents.

These small transitory electro-magnets attract and repel certain permanent magnetic needles, and to-and-fro motion of the latter is communicated by a propelment to the index, being there converted into a step-by-step motion. Here everything is of the finest workmanship; the propelment itself requires to be watched by a lens, if its action is to be observed; the parts never leave hold of each other; the vibratory or rotary rachet wheel are always touching, and thus allow of no detachment or loose shake; the holes of the axes are jewelled: the moving parts are most carefully balanced, a consequence of which is that agitation of the whole does not disturb the parts, and the telegraph works just as well when it is twisted about in the hands, or placed on board a ship or in a railway carriage, as when fixed immovably. When it is possible, as in the vibratory needle, the moving parts are brought near to the centre of motion, that the inertia of the portion to be moved, or the momentum of that to be stopped, should be as small as possible, and thus great quickness of indication obtained. All this delicacy of arrangement and workmanship is introduced advisedly; for the inventor, whom I may call the student here, considers that refined and perfect workmanship is more exact in its action, more unchangeable by time and use, and more enduring in its existence, than that which, being heavier, must be coarser in its workmanship, less regular in its action, and less fitted for the application of force by fine electric currents.

Now there was no accident in the course of these developments; if there were experiments, they were directed by the previously acquired knowledge; every part of the investigations was made and guided by the instructed mind. The results being such (and like illustrations might be drawn from other men's telegraphs, or from other departments of electrical science), then if the term education may be understood in so large a sense as to include all that belongs to the improvement of the mind, either by the acquisition of the knowledge of others or by increase of it through its own exertions, we learn by them what is the kind of education science offers to man. It teaches us to be *neglectful* of nothing—not to despise the small beginnings, for they precede of necessity all great things in the knowledge of science, either pure or applied. It teaches a continual comparison of the *small and great*, and that under differences almost approaching the infinite; for the small as often contains the great in principle as the great does the small; and thus the mind becomes comprehensive. It teaches to deduce principles carefully, to hold them firmly, or to suspend the judgment—to discover and obey *law*, and by it to be bold in applying to

the greatest what we know of the smallest. It teaches us first by tutors and books to learn that which is already known to others, and then by the light and methods which belong to science to learn for ourselves and for others; so making a fruitful return to man in the future for that which we have obtained from the men of the past. Bacon, in his instruction, tells us that the scientific student ought not to be as the ant who gathers merely, nor as the spider who spins from her own bowels, but rather as the bee who both gathers and produces.

All this is true of the teaching afforded by any part of physical science. Electricity is often called wonderful—beautiful; but it is so only in common with the other forces of nature. The beauty of electricity, or of any other force, is not that the power is mysterious and unexpected, touching every sense at unawares in turn, but that it is under *law*, and that the taught intellect can even now govern it largely. The human mind is placed above, not beneath it; and it is in such a point of view that the mental education afforded by science is rendered supereminent in dignity, in practical application, and utility; for by enabling the mind to apply the natural power through law, it conveys the gifts of God to man.

OBITUARY.

ROBERT BROWN.

THIS distinguished botanist died on Saturday, the 12th of June, at his house in Dean Street, Soho, in the eighty-fifth year of his age. Though less popularly known as a man of science than many of his contemporaries, those whose studies have enabled them to appreciate the labours of Brown, rank him altogether as the foremost scientific man of this century. He takes this position not so much from his extensive observations on the structure and habits of plants, as from the philosophical insight he possessed and the power he displayed of applying the well-ascertained facts of one case to the explanation of doubtful phenomena in a large series. Till his time botany can scarcely be said to have had a scientific foundation. It consisted of a large number of ill-observed and badly-arranged facts. By the use of the microscope and the conviction of the necessity of studying the history of the development of the plant in order to ascertain its true structure and relations, Brown changed the face of botany. He gave life and significance to that which had been dull and purposeless. His influence was felt in every direction:—the microscope became a necessary instrument in the hands of the philosophical botanist, and the history of development was the basis on which all improvement in classification was carried on. This influence extended from the vegetable to the animal kingdoms. The researches of Schleiden on the vegetable cell, prompted by the observations of Brown, led to those of Schwann on the animal cell; and we may directly trace the present position of animal physiology to the wonderful influence that the researches of Brown have exerted upon the investigation of the laws of organization. Even in zoology the influence of Brown's researches may be traced in the interest attached to the history of development in all its recent systems of classification. Brown had, in fact, in the beginning of the present century, grasped the great ideas of growth and development, which are now the beacon lights of all research in biological science, whether in the plant or animal world.

But whilst his influence was thus great, his works are not calculated to attract popular attention. They are contained in the Transactions of our learned societies, in the scientific appendices of quarto volumes of voyages and travels, or in Latin descriptions of the orders, genera, and species of plants. The interest taken in these works by his countrymen was never sufficient to secure for them republication, although a collected edition of his works, in five volumes, is well known in Germany. He was of a diffident and retiring disposition, shunning whatever partook of display, and anxious to avoid public observation. Thus it is that one of our greatest philosophers has passed away without notice, and many will have heard his name for the first time with the announcement of his decease. But for him an undying reputation remains, which must increase as long as the great science of life is studied and understood.—*Athenæum.*

In a subsequent number of the *Athenæum*, Dr. George Wilson, of Edinburgh, the author of the "Life of Cavendish," published by the Cavendish Society, says:—

"The great botanist whose life you have sketched in your last number was so modest and undemonstrative a man that it may be feared he has carried to the grave much knowledge on many points, which all lovers of science would have preferred should not die with him. On one of these points, interesting to a wide circle of physicists, documentary evidence may yet exist,—and I ask the favour of sufficient space in your columns to direct the attention of those in a position to settle the matter, towards the question of such evidence existing.

"Robert Brown took a great interest in the much-disputed problem—'Was Watt or Cavendish the discoverer of the composition of water?'—and strongly favoured the claims of the latter, whom he had often met in early life. He supplied me with information regarding Cavendish for the 'Life' of that philosopher, written for the Cavendish Society, and expressed—though with his customary caution and reserve—an unhesitating opinion in favour of Cavendish's originality and integrity. On one of his latest visits to Edinburgh, after the publication of the 'Life of Cavendish,' he recurred, in conversation, to the Water Controversy, and startled me by stating that there existed a document or documents 'which would put Cavendish's claims as the discoverer of the composition of water beyond dispute.' I do not pretend to give his exact words, but I think I do not overstate their import. He would not enter into any particulars, but shook his head and smiled when I pressed him for further information.

"Two years ago I saw him for the last time in London, and after reminding him of his former conversation, asked him if there was no probability of the document or documents in favour of Cavendish being published. I could not, however, extract more from him than the assurance that there certainly existed such writings. On this point he spoke (for him) freely,—but when I suggested publication I could not get him beyond smiles."

M. AIMÉ BONPLAND.

This celebrated French naturalist died a short time since at San Borja, Brazils, at the age of eighty-five. M. Bonpland was born at Rochelle in 1773. He was the son of a physician, and was brought up to his father's profession, but the political events of the early Republic compelled him to enter the navy. He made a long cruise as a naval surgeon, but took the earliest opportunity of returning to Paris to pursue his studies. There, at the house of M. Corvisart, he made the acquaintance of a young German of about his own age, who afterwards became known to the world as the celebrated Alexander de Humboldt. These young men became intimate friends, and, when M. de Humboldt undertook his expedition to the equinoctial regions of the New World, M. Bonpland accompanied him. During this journey M. Bonpland collected and classed upwards of six thousand plants which were then unknown to botanical writers. On his return to France he presented his collection to the Museum of Natural History, and received the thanks of Napoleon I., who granted him a pension. The Empress Josephine was very fond of Bonpland. She made him her factor at Malmaison, and often sowed in her garden there flower seeds which he had brought from the tropics. After the abdication at Fontainebleau, M. Bonpland urged the Emperor to retire to Mexico to observe events. A few weeks after tendering this fruitless advice, he sat by the death-bed of Josephine, and heard her last words. Her death and the definitive fall of the Empire leaving him nothing to desire in France, he returned to South America, and became a professor of natural history at Buenos Ayres. Subsequently he travelled across the Pampas, the provinces of Santa Fé, Chaco, and Bolivia, and penetrated to the foot of the Andes. Being there taken for a spy, he was arrested by the Governor of Paraguay, and was detained a prisoner for eight years, till 1829. On his release he directed his steps towards the Brazils, and settled at San Borja, where in a charming but humble retreat, surrounded by orange-groves and European shrubs, he remained to the day of his death, receiving with pleasure all French travellers who visited him. He was the author of (among other works) "Les Plantes Equinoxiales," "La Monographie des Melastonies," "Description des Plantes rares et de la Malmaison." "Vue des Cordillères et Monuments Indigènes de l'Amérique ;" and, jointly with M. de Humboldt, "Voyage aux Régions Équinoxiales du Nouveau Continent."

The name of Bonpland is associated with the history of the cinchona barks, this botanist having, in conjunction with Humboldt, visited the bark districts about the year 1790, and described several of the species of cinchona.

BOOKS RECEIVED.

The Dispensatory of the United States of America, 1858. By G. B. Wood, M.D., and F. Bache, M.D. Philadelphia: Lippincott & Co. Pp. 1583.

Principles of Animal Nutrition, *particularly as regards the Vigorous Constitution of the Horse, and the fattening of Cattle, Swine, Sheep, &c.* By George H. Bolton. Liverpool: Printed by Benson & Mallett. 1858.

Edinburgh Veterinary Review, and Annals of Comparative Pathology. Edinburgh: Sutherland & Knox; London: Simpkin, Marshall, & Co. No. 1, July, 1858. (Published Quarterly.)

Journal and Transactions of the Maryland College of Pharmacy, *published by authority of the College.* Edited by William S. Thompson. No. 1, June, 1858. Baltimore: Printed by F. A. Hanzsche.

On the Scope and Tendency of Botanical Study: *an Inaugural Address delivered before the Liverpool Royal Infirmary School of Medicine, May* 3, 1858. By Cuthbert Collingwood, M.A., &c. &c. London: Longmans and Co.; Liverpool: E. Howell, Church Street.

Second Annual Report of the Medical Officer of Health, *made to the Vestry of St. James's, Westminster, April* 1, 1858. Westminster: Printed by Thomas Brettell, Rupert Street.

Report on the Sanitary Condition of the City of London, *for the Quarter ending June* 26, 1858. By Henry Letheby, M.B., F.L.S., &c. London: W. Lownds, Fenchurch Street.

Papers read to the Botanical Society of Edinburgh. By G. Lawson, Ph.D., &c. Edinburgh: Neil & Co.

TO CORRESPONDENTS.

The late Mr Henry Matthew Witt.—In the notice of Mr. Witt in the last number of this Journal, it is erroneously stated that the deceased was apprenticed to Mr. Bartlett. He served his apprenticeship with Mr. George Wylde, King's Road, Chelsea, but subsequently had a private laboratory at Mr. Bartlett's house.

G. E. C. (Maldon).—Smee's *Elements of Electro-metallurgy.*

Omega (Jersey).—(1.) No.—(2.) Apply, by letter, to Mr. Redwood, 19, Montague Street, Russell Square.—(3.) The School of Pharmacy, in Bloomsbury Square; the College of Chemistry, Oxford Street.

M. A. B.—The *Pharmaceutical Journal* is addressed specially to Chemists, but may be purchased by the public like other periodicals. The existence of any objection to such publicity as stated by our correspondent, is quite a novel idea.

J. B. (York) is thanked for his communication, which, however, is not adapted for this Journal.

H. C. C. (Chatham).—We are unable to insert the remarks on the Sale of Poisons Bill, on account of the quantity of matter on the same subject.

W. B. (Plymouth) has sent us a disreputable handbill which is distributed by a Chemist in that town. The Chemist is not a Member of the Pharmaceutical Society.

We have received similar specimens from *M. P. S.* (Bristol).

M. P. S. (Gravesend).—The two labels sent do not make the medicine liable to stamp.

SALE OF POISONS BILL.—In case of any omission in our replies by post to any of our numerous correspondents on this subject, we take this opportunity of acknowledging the communications, which were duly attended to, and some of them would have been specially noticed if our space had not been already overcharged with that subject.

ERRATA.

Page 55, Greenwell, Baker, *prefix* No. of Certificate, 65.
" 56, *for* McCulloc*k*, William, *read* McCulloc*h*, William.
" " *for* McCulloc*k*, Charles, *read* McCulloc*h*, Charles.
" 58, Simmons, Joseph, *for* 1852, *read* 1842.
" 74, Houlton, James, *prefix* No. of Certificate, 214.
" 77, *for* Lynch, John R., *read* Lynch, James Rockliffe.

MEMBER OMITTED.

1847 ..... Whitfield, John ..... Worcester

Instructions from Members and Associates, respecting the transmission of the Journal, to the Secretary, 17, Bloomsbury Square.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington Street. Other communications to the Editor, 15, Langham Place.

THE PHARMACEUTICAL JOURNAL.

VOL. XVIII.—No. III.—SEPTEMBER 1st, 1858.

PREPARATIONS FOR COMPILING A NATIONAL PHARMACOPŒIA.

The Medical Act having transferred the responsibility of publishing a Pharmacopœia from the Colleges of Physicians to the Medical Council about to be constituted, we may look forward with confidence to the appearance, within a reasonable time, of a National Pharmacopœia. The three Colleges had previously taken measures for the accomplishment of this object; many communications had taken place on the subject, and some progress has already been made in the revision of the three Pharmacopœias, with a view of amalgamating the substance of them into one volume, with such omissions and additions as occasion might require. Much, however, remains to be done, and, even supposing the difficulties of adjusting the Materia Medica and the formulæ to be overcome, the arrangements respecting the mode and conditions of publication might have given rise, as on former occasions, to various questions causing delay in the result. The provision in the Act of Parliament being imperative, and the funds which will be at the disposal of the Council being available for any of the purposes contemplated by the Act, there will be no obstacle to the completion of the work within a moderate time. It may be presumed that the proceeds arising from the sale of the Pharmacopœia will eventually cover all the expenses of compilation and printing; but in the preliminary labour of producing such a work a considerable outlay is necessary. The voluntary exertions of Pharmacopœia Committees are, of course, valuable; but the needful investigations and experiments require the services of practical men to an extent which could not fairly be claimed without proper remuneration. Conferences will also be necessary between the representatives of the three Colleges, whether in the capacity of members of the Medical Council or otherwise, and provision must therefore be made for the payment of travelling expenses, as well as for the remuneration of an editor.

Although it is not yet known into whose hands the work will be entrusted, the subject is exciting considerable interest; and as soon as the needful arrangements are completed under the Act, the Pharmacopœia Committees already constituted will be prepared to render such assistance as may be required. We are informed that the Edinburgh College of Physicians has already entered upon the subject in anticipation of the reconstruction of the work under new auspices, for although the authority under which the Pharmacopœia is to be published is changed by the recent Act, it must not be supposed that the Colleges of Physicians will relinquish their interest in, or influence over, the materials of which it will consist.

The Pharmacopœia Committee of the Pharmaceutical Society in London, appointed in August, 1854, under the sanction of the London College of Physicians, has repeatedly conferred with the Pharmacopœia Committee of the College, and some brief notices of its proceedings have appeared in this

journal.* The result of each meeting of the Committee is recorded in the minutes, and may be available when the several portions of the Pharmacopœia are under consideration. The Committee commenced its proceedings by issuing a list of the entire Materia Medica and preparations, taken from Squire's edition of the Pharmacopœias of London, Edinburgh, and Dublin; copies of which were forwarded to Chemists throughout the country, with a view of ascertaining the frequency or otherwise of the several substances or compounds in the list. Other questions have been issued, to elicit information on special subjects. The Committee has also met regularly, and considered *seriatim* the comparative merits of the formulæ and processes, in the order in which they occur in the Pharmacopœias. This revision, however, is not yet completed.

The above remarks are founded on the supposition that the existing Pharmacopœias will be taken as the basis of the forthcoming work. Although the Medical Council, having absolute power, could, if so disposed, commence *de novo* discarding conventional formulæ and compounds already in use, such course of proceeding is not very probable, nor would it be politic, as the present race of Physicians and Surgeons will continue to prescribe those preparations which experience has led them to consider efficacious; and even the authority of an Act of Parliament could not induce practitioners of thirty or forty years' standing to discard their favourite remedies, go to school again, and learn a new system of prescribing. The object to be desired is the simplification of the Pharmacopœia, the exclusion of such articles as experience has shown to be worthless, the addition of a few new preparations recently introduced, and now in common use, and the attainment of uniformity in the strength and composition of preparations used under the same name in different parts of the United Kingdom. In the introduction of any new preparations, care should be taken that the names should not be confounded with those of any other preparations; and it is especially important to avoid any attempt to adapt the nomenclature of chemical compounds to the fashion of the day, which in chemical science, as in costume, varies continually, and would, if introduced into the Pharmacopœia, cause endless doubt and misunderstanding between the prescriber and the dispenser, to the serious inconvenience and danger of the patient.

THE EDUCATION OF APPRENTICES.

When the public press directs attention to the importance of Pharmaceutical education, the circumstance is worthy of remark, as it shows that the subject is felt to be one in which the entire public, and not merely a particular class, is interested. So much has this conviction gained ground, that there is scarcely a newspaper of any note, either metropolitan or provincial, which has not lately alluded to it, and during the discussions on the sale of poisons, pointed attention to what is now acknowledged to be the principal source of danger. We quote from a recent number of the *Morning Advertiser* the following remarks:—

It is a strange omission, both in the "Sale of Poisons Bill" and in the "Medical Bill," that no steps were taken towards compelling those who vend medicines to understand their exact nature. This, possibly, arises from the circumstance of the Chemist and Druggist selling the articles of his trade *retail*, thus entering into competition with the regular Apothecary. Now, a regular Apothecary must be an

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* Vol. xiv., pp. 155, 386, 394; vol. xv., p. 51; vol. xvi., p. 353.

educated man, and receive a diploma from the Hall before he becomes a regular practitioner. Not so the Chemist and Druggist, who hires a shop, and instantly begins compounding medicines, without any previous knowledge of the Pharmacopœia. But, even in the first case, there is a great omission. It is this :—An Apothecary may employ any one he likes to make up the prescriptions sent to him, and make every mixture—sell every drug he thinks proper. Now, the master may be a clever man, a qualified man, but not so the shop-boy. He may be the greatest ignoramus in the parish, yet he is allowed, in the absence of his employer, to weigh life and death in the balance of stupidity, held by ignorance, and meted out by guesswork. If the master is from home, the patient runs the risk of his life. If the master be at home, the dispenser is probably turned into the messenger.

In the *Medical Times and Gazette* this is quoted under the title of "A Chemist's Shop-Boy." Although probably applicable to both in some cases, the remarks were written with reference to the *Apothecary's* shop-boy. But there is a confusion as to the meaning of the term Apothecary; for the article in the *Morning Advertiser* refers to the Apothecaries in Ireland as follows:—

In Ireland no Apothecary can open a shop till he has received his regular diploma, and to obtain this he must have served seven years as an apprentice to a properly-qualified practitioner. Nor can he even enter on the novitiate till he has been examined in Latin and Greek. This at least enables him to make out labels and decipher prescriptions, and be so far able to read and study books of medicine in which these languages, particularly the former, are used, that he can fit himself by proper study for his future examination, which is most strict, and must be undergone, ere he becomes a "licensed Apothecary," and consequently entitled to open a shop and take classically-educated pupils.

The term Apothecary in Ireland comprises all those who in England are Pharmaceutical Chemists. No person except an Apothecary in Ireland is allowed to dispense a prescription, or to mix any two drugs or medicines together for sale. The Druggist is merely a dealer in simple drugs, with oils, colours, groceries, &c. It is true that the Apothecaries in Ireland prescribe as well as dispense prescriptions, and some of them are in extensive practice—the policy of which arrangement is questionable, as the separation of pharmacy as much as possible from medical practice is an object to be desired. But the circumstance to which we wish to direct attention is the law which prohibits any person, not duly examined and licensed, from *carrying on the business* of a Dispensing or Pharmaceutical Chemist, and the strictness with which the preliminary education of Apprentices is enforced. In this respect the Pharmaceutical Society is under a disadvantage, for many youths are brought up to be Chemists and Druggists without any definite idea on the part of their parents as to the exact nature of the education required. They are not obliged to come up for examination, or to become connected with the Pharmaceutical Society; but many of them understanding that such course is recommended, think it may be as well to go with the stream. If, however, the preliminary examination for Apprentices were to be made as strict and comprehensive as it is in Ireland, the consequence would be—not that the English Apprentices would generally conform to the regulations, but that they would spare themselves the trouble of coming up for examination at all, and be content with the title of a Chemist and Druggist. If the law required that Chemists and Druggists should pass the examinations of the Society, all would at the several stages of their education prepare themselves accordingly; but this not being compulsory, some considerable discretion is required in adjusting the nature of the preliminary ordeal so as not to close the door against the class of candidates whom it is desirable to attract. With regard to the subsequent examinations, the Society has more power of keeping up the standard, for young men having taken the first step, are likely to be influenced by the example of Associates and the advice

of Members, with whom they naturally come in contact. But with the Apprentice in the first instance no tie exists, and the idea of a formidable examination would deter the majority from making the attempt. It is here that the sanction of the law is required to secure the object which the voluntary principle can only partially carry into effect, for, if all Apprentices were obliged to comply with certain regulations, their parents would take care to give them the requisite preliminary education; and it is obvious that any deficiency in this respect must in the end affect the interest of the public by failing to secure an efficient qualification in the future dispensers of medicine.

THE MUSEUM OF THE PHARMACEUTICAL SOCIETY.

An opportunity of enlarging the Museum being afforded by the addition of a portion of the adjoining house, a long lease of which has recently been acquired by the Society, it is decided to appropriate a room on the ground-floor, about the same size as the present Museum. The entrance-hall being between these two compartments of the Museum, a glass door on each side will form the communication between them. Some additional glass cases will be required in the new room, which, we believe, will be almost filled by specimens already in the possession of the Society, but not displayed for want of space. Among these we may mention an interesting cabinet of specimens, which was the property of the late Dr. Pereira. There are also cases of specimens in other parts of the house, which will be brought more prominently into view.

The Museum of the Pharmaceutical Society is not so extensive as the Museum of the Société de Pharmacie in Paris; but with regard to the value and rarity of many of its specimens, and the interest attached to them, it has been said to be unrivalled. Dr. Pereira presented a very interesting collection of barks and other drugs, irrespective of the cabinet above referred to, which came into possession of the Society after his decease; and many of the early supporters of the Society vied with each other in presenting the most rare and curious specimens, as well as others varying in quality, to make the collection as complete as possible. The space about to be appropriated will be sufficient for the present, but we have no doubt that a further extension of the Museum will be found requisite in the course of a few years. In the Great Exhibition of 1851, the products from India alone, in the section Chemistry and Pharmacy, filled a large room, and the Museum of the Society ought to contain specimens of such products from all parts of the world, besides illustrations of chemical processes, models of apparatus, &c.

The alterations now in progress will, it is hoped, be completed during the present month, and the enlarged Museum will probably be open to the inspection of the Members at the Pharmaceutical Meeting in October, on which occasion, being the first meeting of the session, the annual distribution of prizes will take place, and a numerous attendance may be expected.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

MEETING OF THE COUNCIL, *4th August*, 1858.

Present—Messrs. Ballard, Bell, Bird, Bottle, Bucklee, Davenport, Deane, George Edwards, J. B. Edwards, Hanbury, Morson, Sandford, and Squire.

MINOR EXAMINATION, *27th July.*

Birrell, David.....Detroit, Michigan, U.S.
Brown, Charles Hills .....Devonport

MAJOR EXAMINATION, *17th August.*

Bolton, Horatio Nelson.....Boston
Nicholson, Frederick.....London
Owles, John Edward.....Southampton
Woolley, George Stephen .....Manchester

MINOR EXAMINATION.

Deighton, John Milner.....Worcester
Gray, Frederick.....London
Hughes, Joshua .....Crickhowell
Rawling, John Wray... .....Wisbeach
Wilson, Charles Wallace .....London

REGISTERED APPRENTICES.

NAMES.	RESIDING WITH	ADDRESS.
Atwood, John Charles.....	Mr. Cracknell.....	Edgeware Road
Hopgood, Richard Cooper	Mr. Hopgood.....	Chipping Norton
Ritchie, John Moffat	Mr. Medley	Derby
Shaw, Benjamin	Mr. Gissing	Wakefield
Webster, George Watmough,	Mr. Webster	Warrington
Wilkinson, George	Mr. Wilkinson	Manchester

EXAMINATION IN SCOTLAND.

A MEETING for Examination will be held in the Society's Rooms, No. 51, George Street, on Wednesday, 13th October.

Parties desirous of coming before the Board, with the view of joining the Society as Members, Associates, or Pupils, are requested to communicate with the Secretary, 121, George Street, at least ten days before the day of meeting.

Edinburgh, August, 1858. JOHN MACKAY, *Secretary.*

ORIGINAL AND EXTRACTED ARTICLES.

AMBROSE GODFREY HANCKWITZ.

Date 1660—1740.

BY MR. JOSEPH INCE.

(*Continued from page* 130.)

AN evil star was shining when Godfrey was led captive by the wiles of a Rosicrucian.

[The Rosicrucians were a religious sect, who flourished in the early part of the seventeenth century: they blended the mysteries of the Christian religion with the several processes of alchemy. Their symbol was a cross composed of four red roses, hence the name—others derive the word from a founder called Rosenkreutz. Every man has his failings, as well as every age its follies—the snare of that century was the dream of alchemy, as the dream of speculation is of this.]

Godfrey was a German, and sharing the instincts of his race, he began life with a youth of impulse, and ended it with an old age of caution; to use his own words, "he was an eager and indefatigable searcher and pursuer of everything and in everything that relates to chemistry, whether seemingly or really. Though never so superficial, yet must he try everything; and as that which is foolishly called the philosopher's stone is one branch that relates to chemistry, and as that deceitful bewitching art is so penned and couched that it is able to put a diligent man in chemistry to a stand and thinking; and if by chance he is taken with it, and with that sort of men, he can hardly leave it till he has had his bellyful of vexation and charges."

When in due course of time Godfrey had quietly settled down into the sedate philosopher, he determined "to rehearse and to remind some passages of life, what folly one is able now and then to commit in younger days before one has bought wit with charges and trouble." Early recollections had perhaps left a slight tinge of bitterness behind them, for he writes, "do we not find the world even bewitched with mistakes soon (eager) to dig each other's sink and grave instead of examining first, though they little know how near they are to it themselves, and it is almost no crime to say, the world is like a great Bedlam, people are all mad." "But since" (to quote the same letter) "Providence has planted us in a reasonable country, God be thanked, where there is freedom and liberty," Godfrey resolved to lift up his warning voice for the benefit of future generations, and left behind him an elaborate account of his own tribulations—"lest my sons should one time or other be of that bewitching number whilst they are yet novices and green, I leave this for their veu (view) on purpose to frighten them into discretion, to free them from that plaguy people that swarm to draw people into those nonsensical fancies by their fantastical and visionary persuasions."

In one of the windows of the Bodleian, at Oxford, there is a painting of St. Augustine. The venerable Father is represented in the act of composing a book—a task he evidently considers as no trifling matter. He is seated in a high-backed chair in full sacerdotal robes. The mitre crowns his head; the crozier is in his left hand, while his right hand grasps a pen: thus thoroughly prepared for all emergencies, he transcribes his meditations.

With like seriousness of manner, Godfrey, about a century and a half ago, sat down to write a pamphlet called "An Apology and Letter touching a Crosey-Crucian." Had his observations tended to arrange the destinies of Europe he could not have been more in earnest, nor have attached a deeper importance to his theme. The reader is spared no phase in the curious history which he relates, but is made to wander up and down through a wilderness of detail, and for that very reason the manuscript is worth preserving, as it conveys a faithful record of the times, and forms a strange episode in the annals of Pharmacy, as well as in the life of Godfrey.

The Hon. Robert Boyle was a philosopher with an inquiring mind—had he lived in later days he would infallibly have discovered the North-West Passage. Whilst on his travels in Germany he met with a man who was gifted with no ordinary supply of conversation: this worthy individual talked upon two subjects, metals and religion, making them play into each other's hands, and professed that not only could he produce gold from baser materials, but that to him had been revealed the secret of the Philosopher's Stone. Boyle was delighted with the charmer, and had faith in his pretensions. His admiration speedily assumed a far more practical form, for he gave the charlatan a liberal salary, sent him to England, and placed him under Godfrey's charge and general superintendence. Godfrey was in his element; he had to pay the money, to watch the experiments and report progress to his honoured master; nothing, indeed, ever pleased the industrious Hanckwitz more than when he was as busy as a baker and had something about which to write.

At first he was in his turn smitten with the lofty aspirations of the would-be

philosopher, and regarded him as a superior being, a result which happens inevitably when great pretension encounters little knowledge. "I was wrapped up" (he says) "and big with expectation of great things, so that I devoted myself wholly to him, placed all my happiness, life and death, in him, and infused in me an excess of desire to see once in God's time also the same sight he had seen. (I may say two fools well met.)" Little by little the sad truth became apparent that practical results were wanting; not a grain of transmuted gold was visible, and though his discourses were as long as the Abbey sermons, the discovery of the Philosopher's Stone remained as far off as ever.

Godfrey was in a great strait. Boyle was constantly wanting information, the Philosopher was as constantly wanting money. Godfrey's belief in the man was still unshaken, and he cherished a deep reverence for his art. But clouds began to appear which gradually darkened into a storm; distrust became the forerunner of anger, and Godfrey's wife expressed her mind in tolerable Saxon English. Whereupon the unhappy household made light of the opinion of Dr. Watts that "there should be peace at home." The rest of the narrative will be best conveyed in Godfrey's own recital.

"What burthen was it how to preserve peace with my wife to see these passages, and how to keep him in my master's favour, and how to procure him money continually, which was the continual outcry, a reasonable creature would not have wished the life and torment to a Turk; and none can be sensible of it unless he that has undergone the experience: and what all this was for? for nothing but poor ridiculous chimeras and secrets (as he called it) as I would at any time sell for sixpence. And had I continued to him never so long, neither Mr. Boyle nor I should have seen effected anything what he proposed and imbibed me with, as you shall hear. For before he could have his power on me to serve his turn, his business was to bring me first firm over his side that I might be taken with his principles of revealed religion, and likewise to the art he pretended to, to excite my love for both; then he thought he could do with a young fool (as I was then) what he pleased, so he took pains according to engage and influence me at first into certain religious notions, explaining and arguing things against the three antichristian religions as he called it, viz. Popedom, Lutherdom, and Calvinism—and all these successive discourses at last terminated into illuminations and visions."

The history of imposture amply demonstrates that it is by no means unusual for a pretender to see visions and to dream dreams. Godfrey was fascinated against his will by their recital, and was under the entire control of the enchanter. The wary Rosicrucian now suggested that he was not altogether removed above human sympathies, and intimated that he had a wife in Germany, who was wasting her sweetness in that desert air. Godfrey wrote to Boyle upon the subject, and received a favourable answer.

"By whose consent I told him (the sophister) to fetch his wife, since as she got (her living) there by spinning, she might as well spin here, and Mr. Boyle would be at the charges (as he was). And he did go and come with his wife, and a grown up daughter he had, and I was the continual messenger and agent between them, and thought myself the happiest creature in the world to come to such preferment as to be the book and favour of this great man and to partake of his philosophy.

"So in fine he comes from Holland bag and baggage again, and as I thought I saw an angel; lodged him for a while for want of room (you know what a little house I had) in my own bedchamber in Chandos Street, along with me and my wife all in one room, being then a poor young beginner, and a servant too: and because of that, the house though but little was filled with the incumbrance of lodgers (till I had provided lodgings for them elsewhere). You may think what patience I had, but I got him in a little time lodgings in a little household himself at Mr. Kinit's.

"I was caution for the rent by my master Boyle's directions, and money I

brought from time to time, and then all was well, and there was built some fiddling furnace, enough to make one laugh; then there was this and that delay to go on, and I do not know how long and no work to be seen. And though when I dunned, he durst not throw the pearl before the swine (as he said) so soon yet, yet patience—we thought better opinion of us will come in time if his work does but go on in the meanwhile. But the structure of the furnace and the other chemical contrivances easily denoted the consequences, even his ordering of work and manipulations. And this famous going on must now and then be reported to worthy Master from time to time, what news, &c.? and what has he done? and what have you seen? being continually the query: continually eager, &c., desirous of news to hear and inquire. So I let you judge whether I did not begin to be bravely teased and haired out of my life and wits on both sides; one eager to see and to hear (because he paid for it), and the other continually craving and teasing for money and nothing to be seen for it, but extreme simple doings and foolery, a shame to relate. So discontents then begun. I was reflected on and tormented by the projector, yet I strove to keep him in Mr. Boyle's favour as well as I could. Then I had in my own house by this projector's directions, three things at work in a digesting furnace, viz. the resuscitation of plants, the separation of sulphur in animals (viz. birds) and the mercurification of lead (as he called these things). The rehearsal of which, the work, the fetching of it, and where to fetch it, and when to fetch it (viz. the plant) and how to work it, would make a comical relation had I room here in a letter.

"Item—Though Mr. Boyle paid everyone to a tee, yet knew well enough how to bestow money, how to limit his gifts and not be flush, so they began to slacken.

"Item—Was mistrusted by the projector whether he had all what Mr. Boyle bestowed, for he could scarce persuade himself that such a rich man as Mr. Boyle should slacken his purse. But God knows my heart; and therein I do not sin that I testify it with God to my best knowledge that he had all, and seven pounds over and above Mr. Boyle's gift out of my own salary.

"Item—And when by direction I began to work in my house, his lesson was, here is need of regeneration work, self-denial and to be very good, &c. All which was very well ordered, and good discourse for so great and wonderful a work, if he had but been the person that could teach it, because says he, we shall soon after this digestion, come to evaporating of principles. Adding however this flattery to me, that he thought he saw in me as prognosticated, good principles, and the performing of great things; but when all these schoolings proved abortive, it was easy for him to lay unregeneracy at my door."

How slight has been the change since Godfrey's time! A somewhat well-known oculist of the present day includes a professional piety in his mode of treatment. One of his patients told me that he once paid the learned man a visit. There was nothing remarkable in the room, while the doctor to all appearance was in the possession of a sound mind, in the requisite sound body. The eyes were duly examined, and a lotion and a pot of ointment were produced. "Now, before I give you these remedies," said the oculist, "I must read a chapter in the Testament, and then I shall pray for your sins." "Stop!" said the patient, "my eyes are considerably opened, and I have the honour to wish you good morning."

Things were rapidly drawing to a crisis. "I could spare no more" (continues Godfrey), "but scarce and bare enough for myself, yet what I could spare must be attacked now and then, for which I had my wife upon my back, and Mr. Clayton a minister, and Doctor Moulins, at my house, depending for want of some trade only upon my salary: and no shame for me that at that time Nihilum Album was my beginning. Yet in the midst of all this (though he knew my mean condition very well), his attacks were continually upon me, and he even sent his troublesome wife to me at my door, who scolded in the

German tongue and made people stare, yet raised a heap of people to my great trouble and prejudice, saying you are my ruin, you brought me over, or else I was well in Holland; and this railing was by his consent, and it was then he began to question my fidelity, whether I delivered all what Mr. Boyle gave. I was now teased almost out of my life with the continual song, money, money, sometimes he, and sometimes his wife, a terrible bawling creature. She followed once my wife in the street with scolding, spitting at her, and exclaiming, though, thank God, all in German, that the people understood not, but scandalous indeed it was, only the best of it was that she was not understood.

"I let you judge what condition my poor wife was in to such an unusual attack; then her relations and other acquaintances of my wife came upon me, and the compliment was then, you fool, you blockhead, &c., why do you not forsake the process-monger? how can you bear all this? but he had so bewitched me that all these flung one in no disorder or passion, but only in grief and shame, though I am a passionate fool enough otherwise.

"Item.—A letter was writ by this sophister to Mr. Boyle, superabounding I suppose of complaints, and he brought it himself; and to make the address to Mr. Boyle the more authentic, joined with it some curiosity in a box. But my worthy Mr. Boyle had been informed of the passages and my misfortunes by Dr. Moulins and others what was the matter, and would not accept either the letter or box, but excused it civilly; upon which the sophister judged that that might be likewise my doings, his passion increased then to that height, that his exclaimings would have frightened others as well as myself, railing now that I had made him odious to Mr. Boyle. I was a devil and a monster, &c., and unless God was merciful unto me I was in a damnable state, and so forth. I was now given up to Satan, and nothing I found but money could reclaim or redeem me from it again (of which I had little enough indeed). But I being still much wrapped in him, all was not able to move me to revenge, or passion, but was patient and silent, thinking the fury might be over at last. So I took occasion then to consult him as a physician, and mentioned no other matters, and asked his advice for one sick in my family. But it was plain enough that he by that time expected no further benefit of me, and answered, I know you not. Whom man binds on earth (says he) is bound in heaven. And whatever I argued to make him change his discourse, he went on in that way, looking frightful upon me, seeing anger and fury in his face, I neither scolded again nor aggravated, but took it as if a dog had bit me. His wife herself seeing him so, pulled him by the sleeve, saying, honey, heart, dear! &c., but he then went on railing the faster, saying to me, get you gone, Satan. So I found, God be blest, that I had paid now full prenticeship to meddle with Rosicrucians and madmen. This is the fruits of meddling with process-mongers. Thinking then that they have haunted and followed me a great deal, I will save myself henceforth from such like torments, and that has so much charges and trouble in it too; for I found ever that their society and associating with them, terminates only in vexation and trouble, because their business is only to draw money from you, and if they do not succeed, woe be to you. But God be merciful unto his soul and unto us all. He is gone—and how soon we may, God knows. I wish him eternal rest."

With this pious benediction, Godfrey consigned his enemy to his last repose; years afterwards he wrote the following beautiful passage on the claims of true philosophy—"How strange that poor finite mortals should think to outdo an infinite Almighty God their Creator, who to make gold, and silver, and so many other species of metals, constitutes for it perhaps the influence of sun, moon, and stars; to excite in the ground a ferment in particular earths and juices: to form first a vitriol, or matrix, then to grow and concrete from a soft into a hard substance. And who knows what number of years or ages, God's providence hath this a hatching to bring it to maturity, which the foolish whimsical philosopher pretends to do a nearer way, and in so little a time as a year

and a half, or three quarters of a year, and that above ground in a furnace, and that by matters already destinated and ergo individual for ever. That knows nothing of the constituent parts of metals which no microscope can demonstrate to the eye, and yet pretends to compose a seed of their own, and exemplify their discourse with the ferment of liquors and the germination of seeds, when the house of the faries is held, and so forth, too long to relate. And thus they go on strangely in their whimsies, and when they have worked and projected ninety-nine years, yet they find at last there is but one Creator, and that he that made that bit of gold which they show for their own making, can make a hundred thousand in a minute, and their's was only an extraction of gold dispersed in minute parts (in the same destinated form as gold already), *i.e.* was only an extraction of those very metallic matters of which (they) dream to compose their seed, and call it their prima materia."

The charlatan may be forgiven, whose very follies led Godfrey to such an admirable conclusion.

(*To be continued.*)

REPORT OF THE RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION, AND OF THE APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

BY B. H. PAUL, Ph.D.

(*Continued from p.* 137.)

Distillation of Peat, Brown Coal, &c.—Since 1847, Dr. Vohl* has been engaged with the investigation of the methods by which volatile oils, paraffin, asphalt, and creosote may be obtained from the tar produced by destructive distillation of bituminous minerals. These experiments have all been made with at least one hundred pounds of peat, &c., in order that the results might have a technical value, and serve as a guide for conducting operations on a working scale. Smaller experiments made with a few pounds of material are likely to lead to error, and are therefore valueless as regards the working of a factory, from furnishing scarcely an approximative basis for judging of the value of any particular material. Moreover, the phenomena presented in large experiments differ somewhat from those recognizable in other cases, and hence facts of importance as to the working on a large scale may be overlooked.

Among other materials that have been examined is the Hanoverian peat, which is tolerably hard, and contains but few root fibres. Its colour is dirty brown, density small, and the amount of ash also small.

Successive quantities of this peat were distilled in an iron retort similar to those used for making gas, three feet long, one foot wide, and ten inches high. The discharge pipe was four inches diameter, and the retort was closed by an iron plate covered with clay and fixed by a screw. The discharge pipe of the retort was six inches long and somewhat inclined. This pipe was covered with packing cloth, kept moist during the distillation, and was connected with two two-necked cylindrical vessels of sheet iron cooled in the same way as the discharge pipe.

By this means the gas was separated from condensible products, and was then passed through some twenty feet of condensing pipes before being collected in a gasometer.

After charging a retort, the distillation was commenced at a gentle heat in the first instance and terminated at a red heat. At first large quantities of water-vapour were disengaged, together with a little empyreumatic oil, and it was not until the greater part of the mechanically combined water was separated, and after the temperature had been raised to dull redness, that a copious evolution of vapour took place, which, when condensed, flowed in a thin stream into the receiver.

The gas that appeared during the first stage of the operation was not combustible; consisting chiefly of carbonic acid. Afterwards, at a higher temperature, it became

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* Dingler's *Polytechnisches Journal*, cxl.

combustible, burning with a bright clear flame and afterwards with a pale blue flame, being in fact then carbonic oxide.

Sulphuretted hydrogen, which is produced in such large amount in the distillation of brown coal, &c., does not appear among the distillation products of peat; but at the end of the operation a sensible amount of cyanide of ammonium was disengaged.

The volatile liquid products of distillation collected in the several condensation vessels were mixed together. The tar, being of less density than the watery liquid, was separated with great ease by means of a funnel. According to the way in which the distillation is managed, this tar has a density of from 0.870 to 0.895.

The Hanoverian peat was found to yield on the average—

Tar	9.0630
Ammoniacal water	40.0000
Charcoal	35.3120
Gas and loss	15.6250
	100.0000

The carbonaceous residue presented the original form of the peat, but its volume was reduced about one-eighth. It was of a dark colour, and burnt like good wood charcoal without giving off any odour. It left a small quantity of ash, somewhat yellow, from the presence of oxide of iron. This charcoal bore a blast tolerably well, and might therefore be of use for metallurgical purposes.

The tar, after being deprived of water, was subjected to fractional distillation, the several products treated with alkalies and acids for the purpose of purification, and then again distilled by means of steam. In this way there were obtained, besides paraffin and asphalt, two different oils and a considerable amount of creosote and carbolic acid.

The watery liquid yielded a considerable amount of acetic acid and ammonia, as well as butyric and metacetonic acid.

The per-centage amount of these products from the tar were—

Light oil, sp. gr. 0.830	19.457
Heavy oil, " 0.870	19.547
Asphalt	17.194
Paraffin	3.316
Creosote and loss	40.486
	100.000

The light oil was a clear, colourless, mobile liquid, of not unpleasant odour. It was quite free from creosote, and consequently did not become brown by absorption of oxygen when exposed to the atmosphere. It was perfectly volatile. As a solvent it was remarkably efficacious upon resins, fat, and caoutchouc, leaving these substances again on evaporation, without any smell. This oil was free from oxygen, and was found to have a composition similar to elayl gas. When lighted, it burnt with a smoky flame and considerable light. In lamps of suitable construction it burnt without charring the wick, which required cutting only every third day. The charring of the wick is chiefly due to the presence of creosote in the oil.

The nitro compound of this oil is analogous to nitro-benzol, and like it may be substituted for bitter-almond oil in perfuming soap, &c.

The heavy oil was of a pale yellowish-brown colour, had little smell, and was less volatile than the former oil. It could be burnt in lamps, and gave a better light than the light oil. However, it is necessary to trim the wicks after some eight hours. This oil may be used with advantage for preparing gas.

When this oil is mixed with fat or resinous soap, it furnishes an excellent lubricating material, that does not solidify in winter or by exposure to air.

The asphalt obtained by the distillation of the tar has a fine black colour, and may be used for making black varnish or lamp black.

The paraffin obtained from peat tar is very hard and translucent, and is well adapted for making candles. The amount of paraffin yielded by peat is twice as great as that from leaf-slate, and is nearly the same as that from the brown coal, or lignite, of Aschers-leben. It may be mixed with some ten per cent. of stearin without injury.

The charcoal produced in the distillation of peat may be used as fuel in the works, and the ash may be serviceable as manure.

The ammoniacal water would of course be treated in the usual manner, so as to obtain sulphate of ammonia.

The gas given off in the distillation may be advantageously used for heating the rectifying apparatus, and when purified with hydrate of lime it is a good illuminating gas. Four retorts yield as much gas as is requisite for working a fifth retort, when used as fuel with proper precautions.

The creosote yielded is of a dark brown colour, and contains from 80 to 85 per cent. of pure creosote and carbolic acid. It is an excellent material for impregnating wood to be used in ship-building, railway sleepers, &c., and it may be employed in making lamp-black. It is to the presence of this substance that the disagreeable smell of the oils obtained from peat tar is due. Some of the oils occurring in commerce contain from six to twelve per cent. of creosote, and consequently become brown when exposed to the atmosphere.

The treatment of the oils distilled from the tar is very simple. By the fractional distillation there are obtained a portion of oil that remains liquid and another portion that solidifies on cooling. The former is mixed with caustic alkali, for the purpose of separating creosote and any other substances of an acid character that would interfere with the treatment with sulphuric acid. By this means the oil is rendered nearly colourless, and freed from a strong penetrating odour. After decanting off the oil from the alkaline liquid, it is mixed with ten per cent. of sulphuric acid in a leaden vessel. Considerable elevation of temperature takes place, and after a while the oil is run off into a vessel from which it is distilled by means of a jet of steam, after any adhering acid has been neutralized by caustic alkali.

The oil thus obtained is clear, colourless, free from creosote, and without unpleasant smell. That which remains in the distillation vessel is fit for lubricating purposes, and does not require any further treatment.

The paraffin oil is in like manner treated with alkali and acid, and distilled by steam. The residual paraffin mass is placed upon a strainer connected with a suction apparatus, consisting of a vessel of water with a discharge pipe thirty-two feet long at the bottom, dipping under water at a much lower level, and furnished with a cock. By discharging the water the paraffin is left upon the strainer as a pearly-white dry mass, without smell. In order to separate any remaining trace of oil, it may be melted, mixed with ten per cent. of the white oil, and after the mixture has been cooled, the liquid portion may be separated by pressure.

General Conditions of Plant Life, and the Functions of the Soil as regards the Nutrition of Crops.—Professor Liebig is again directing his attention to the physiological chemistry of plants, and in a new series of "Chemical Letters," has placed before the public some important remarks* on the subject.

After pointing out that plants consist of substances that are partly combustible and partly incombustible, the most essential among the latter being phosphoric acid, potash, silica, sulphuric acid, lime, magnesia, iron, and chloride of sodium, he goes on to state that it is now regarded as a well-established fact that the constituents of the ash of plants are materials of nutrition, and, as such, are essential to the development of plants, just as carbonic acid, water, and ammonia, are essential for the production of the combustible, or organic portion of plants.

However, the atmospheric elements of plant-nutrition do not feed plants, without the simultaneous influence of the constituents of the soil; and, in like manner, the latter are ineffective when the former are deficient. The growth of plants requires that both conditions shall be combined. Hence it follows that no one of the above-named substances has a greater value than the other as regards plant nutrition—they are in this respect of equal value. To the cultivator of land, who in order to attain his object must provide for his fields a supply of all these substances, they are, however, of unequal value; for when one of them is deficient in the soil, he cannot calculate upon obtaining a crop unless this deficiency is supplied. The constituent that is deficient then acquires an especial value in relation to the others, which, like lime in calcareous soil, are abundant in the soil.

All the materials that constitute the food of plants are inorganic; those that are gaseous are taken up by the leaves, the soil constituents by the roots; the former are

* *Allgemeine Zeitung*, 1857, No. 175.

often constituents of the soil, and are then taken up by the root-fibres as by the leaves. The gaseous constituents of plant food are by their nature diffusive, while the soil constituents remain in the same place.

Plants grow in South America, in districts where there is no rain for many years, and they receive the constituents of their organic substance directly from the atmosphere and dew; thus sufficiently proving that the atmosphere contains enough of these constituents for their full development.

The amount of these substances in atmospheric air is comparatively very minute. Supposing all the carbonic acid and ammonia disseminated through the air to be collected into one layer round the earth of the same density as at the level of the sea, the former would be rather more than eight feet deep, and the latter barely two lines deep. Both these substances are abstracted from the atmosphere by the growth of plants. If the whole surface of the earth were a continuous meadow from each acre of which a crop of hay were annually removed, in the course of from twenty-one to twenty-two years the whole of the carbonic acid would be abstracted from the atmosphere by the meadow plants, and the air would cease to be nutritive to plants. We know, however, that provision is made for the duration of organic life. Man and animals live upon plants ; all organized beings have but an ephemeral existence ; in the vital process of animals the food by which they are supported is converted again into what it originally was ; the bodies of all animals undergo, after death, the same changes as the food of animals—their organic substance is reconverted into carbonic acid and ammonia, and both being gaseous, are restored to the atmosphere, where they serve for the production and development of a new generation. Therefore as regards the elements of the organic substance of plants and animals, the duration of organic life is most intimately connected with the restoration of these conditions, which is provided for in the cycle of changes, which may be taken advantage of by man, but in any case go on without his aid. Where corn and other produce accumulate and grow, it is consumed by man or animals, and reconverted into the original elements of nutrition. Thus the air receives at one place and continuously an equivalent of what it loses at another place, and by its natural mobility maintains uniformity throughout.

It follows from these facts that the farmer would seldom require to provide for a supply of atmospheric food materials for his crops ; and because there is a natural provision for this, the farmer need not give the least attention to this point any more than the forester, who annually accumulates, on a given area, as much and even far more of the atmospheric food materials. Consequently, when the farmer finds that his crops do not flourish, he must not ascribe the scantiness of his crops to deficiency of carbonic acid and ammonia. The proof that there was no such deficiency may be found in the fact that in adjoining fields the crops of clover, for instance, have been good, which could not have been the case if there had been any deficiency in the supply of food. It is impossible to suppose that the air over the fields of corn and clover differed in the amount of carbonic acid and ammonia, and the same holds good as regards the soil : for upon the same soil that yielded a very small produce of carbonaceous and nitrogenous substances in the form of corn, he obtains, without the addition of anything, four or six times the quantity of these substances when a grass crop is grown. The source whence the elements of these substances were derived was therefore accessible by both kinds of plants ; the failure of the corn was not due to a deficiency of atmospheric food ; on the contrary, there was so much present, that four or six times as much might have been taken up by the corn ; but this excess was ineffective as regarded the corn.

Any food material is ineffective when there is a deficiency of any one of the other food materials which determine its efficiency. There was no deficiency of atmospheric food ; consequently the failure of the corn crop must be due to some other circumstance, and it is most natural to seek for this in the soil. Grass and corn crops require for their development the same soil constituents, but in very different proportions. The development of the former shows that the soil constituents and the atmospheric constituents were furnished in such proportion as was requisite for its nutrition. The failure of the corn crop shows that there was some deficiency of the soil constituents requisite for it. Accordingly, in all instances of the failure of a crop, the immediate cause must be sought in the soil, not in a deficiency of atmospheric food.

But what are the functions of the soil, and in what manner do its constituents

take part in vegetation? The process of nutrition consists in an appropriation of food; a plant grows inasmuch as it increases in mass, and its mass increases inasmuch as the constituents of its food become constituents of the plant itself. Out of carbonic acid is produced sugar; for instance, silica becomes a constituent of the stalk, potash exists in the juices, phosphoric acid, potash, lime, magnesia, become constituents of the seed. In the action of a food material, a distinction must be drawn between the rapidity of this action and its duration. As a general rule, the action depends upon the sum of the acting materials, corresponding to the quantity that can be taken up, and is taken up, by the plant during its growth; a deficiency reduces the crop, but an excess does not increase it beyond a certain limit. This excess acts during the next period of growth; the continuance of the crops depends upon the residue remaining after each period of growth; if this residue is tenfold greater than is required by the full crop, it will suffice for ten full crops in ten years.

In order to understand the action of the soil and its constituents upon vegetation, it must be remembered that the food materials it contains are always capable of being effective, although they may not always be effective; they are always prepared to enter into activity, provided the conditions for such activity exist. The farmer requires eight substances in the soil, in order that all his crops may flourish, and that his land may yield its full produce. Some of these are always present in abundance; three are, as it were, only lent to most soils.

It has been believed that plants obtain their food from solution; that the rapidity of action is intimately connected with the solubility of the food materials; that by means of rain-water and carbonic acid the effective constituents of the soil were supplied to the roots of plants. The plant was compared to a sponge, which, partly in the air and partly in the soil, absorbed from the soil as much as it gave off by evaporation into the air; that whatever was dissolved in the water would pass into the roots, and that the plant would appropriate these dissolved substances in its nutrition, the soil and the plant being both passive. It has been considered that a food material in the soil, remote from any root, might feed the plant if there were water to dissolve this food material; that in consequence of the evaporation from the leaves, the roots sucked up water which in this way passed to the roots, together with the substances dissolved in it, and served as the carrier of soil constituents to the plant. But this has been shown to be a great error. The inference that has been drawn from the action exercised by water and carbonic acid upon rocks, as to their action upon soils, is incorrect. There is no chemical phenomenon more remarkable than that presented in the behaviour of soil suitable for the growth of plants.

The simplest experiment suffices to show that by filtering rain-water through soil, this water does not dissolve a trace of potash, silica, ammonia, or phosphoric acid; that the soil does not yield up any one of the materials of plant food that it contains. Apart from mechanical action, the most continuous rain is incapable of extracting from the soil any of the chief conditions of fertility. The soil does not merely retain what it may possess of plant food; its functions extend beyond this. When water containing ammonia, potash, phosphoric acid, or silica in solution, is brought in contact with soil, these substances are abstracted from the water by the soil. Those substances only are completely abstracted from solution which are indispensable materials of plant food; others remain wholly or partly in solution. Potash and soda are remarkably similar in their chemical character, and their salts have many characters in common. Chloride of potassium so closely resembles chloride of sodium as to be barely distinguishable by an experienced person, but the soil distinguishes between them at once; for while a solution of chloride of sodium passes unaltered or nearly so through soil, a solution of chloride of potassium is decomposed, the potassium being retained, while the chlorine passes away in the water as chloride of calcium.

This capability of absorbing ammonia, potash, phosphoric acid, and silica from solution, is limited, and each kind of soil possesses it in a specific degree. A sandy soil absorbs less than a marly soil; this again less than a clay soil. The substances thus absorbed by soils remain insoluble, but still in a condition suitable for being taken up by the roots of plants. This fact shows that the plant must be to some extent active in taking up its food from the soil; the evaporation from the leaves certainly contributes some assistance in this respect, but there is in the soil itself a

provision against a too copious supply. The food constituents of the soil cannot pass into the plant except by the aid of some influence exercised by the roots ; but the nature of this influence, and the precise details of this phase of plant nutrition, remain to be determined by future investigation.

Chemical History of Inosite.—Dr. Vohl* has, on a previous occasion, shown that unripe beans contain inosite to the amount of 0.75 per cent., and more recently he has prepared a considerable quantity of this substance, for the purpose of studying its characters.

Its density at 41° F. is 1.1154, and that of the saturated solution at 66° F. is 1.0548. This solution consists of

Inosite.....	14.294	100.000
Water.....	85.706	

consequently inosite dissolves in about six times its weight of water. The crystals contain from 16 to 17 per cent. of water, or four equivalents. When a saturated solution is evaporated at 212° F., the inosite is obtained anhydrous. When a solution is frozen the inosite separates as white opaque crystals that are not readily dissolved again when the ice is melted; these crystals are anhydrous. Dr. Eickhorn has found that inosite has not any rotatory power.

The concentrated solution of inosite is not syrupy, and when pure, does not undergo change. Decomposing membrane determines by contact the production of lactic and butyric acids, as already observed by Scheerer.

Chlorides of sodium and potassium are readily dissolved by inosite solution, but no crystalline compounds are produced, as in the case of grape sugar.

Cloetta has stated that inosite gives a green precipitate with an alkaline solution of oxide of copper, but Dr. Vohl does not find this to be the case with pure inosite. However, his account given of the reaction of inosite with basic acetate of lead is partially corroborated. When a very dilute solution of inosite is mixed with a concentrated solution of the lead salt, there is produced very slowly in the cold, and immediately when heat is applied, a colourless transparent jelly, which, when protected from the air, does not alter, and, as Cloetta states, becomes crystalline. No substance of definite composition could be obtained from this precipitate.

When inosite is dissolved in dilute nitric acid, and the solution evaporated to dryness in a water bath, decomposition does not commence until the solution has been much concentrated. Then a considerable quantity of nitrous vapour is given off, and oxalic acid is produced. After separating the oxalic acid the solution could not be made to yield crystals, and after some time deposited purple flakes, soluble in dilute hydrochloric acid, and separable again by neutalization with ammonia.

Concentrated nitric acid converts inosite into nitroinosite. This substance has a composition corresponding to $C_2 H_6 (NO_4) CO_{12}$, or $C_2 H (NO_4) O_2$. It crystallizes anhydrous and forms well-developed rhombohedrons when crystallized from alcohol.

Nitroinosite is insoluble in water when pure, and it is not altered by exposure to dry or moist air.

Dr. Vohl has made experiments for the purpose of determining the applicability of nitroinosite for percussion caps, and finds that it might be used for this purpose if it could be procured in sufficient quantity.

Estimation of Nitric Acid.—The results obtained by M. Pelouze's† method are not always quite trustworthy, arising chiefly from the following circumstances.

1. The action of air upon the binoxide of nitrogen mixed with water vapour in the flask, giving rise to reproduction of nitric acid.
2. Imperfect expulsion of the binoxide of nitrogen from the liquid, in consequence of which it reduces more permanganate than corresponds to the protosalt of iron present.
3. Escape of nitric acid before acting upon the protochloride of iron.
4. Possible loss of iron when the chloride is deposited above the level of the liquid.

Professor Fresenius has therefore devised certain modifications of this method for the purpose of providing against these sources of error, and has succeeded in obtaining results that are more satisfactory.

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* *Annalen der Chemie und Pharmacie*, lcv., 370.

† *Ibid.*, cvi., 217.

" A tubulated retort of about 200 cub. cent. capacity is fixed with the neck inclined upwards. About 1.5 grm. of clean iron wire is introduced and covered with 30 or 40 cubic cent. of fuming hydrochloric acid. A current of hydrogen washed with potash is then passed into the retort by means of a tube extending just into the tubulure of the retort; the beak of the retort connected with a U tube containing some water, and the retort heated gently until the iron is dissolved. After the retort and its contents have cooled, the stream of gas being kept up meanwhile, the weighed quantity of nitrate not containing more than 0.2 grm. nitric acid, is dropped into the retort through the neck, in a small glass tube; the U tube again connected, and the retort warmed for about a quarter of an hour in a water-bath, then heated over a gas-flame so as to keep the liquid boiling quickly until a few minutes after the dark colour due to the presence of binoxide of nitrogen is replaced by the colour of perchloride of iron. Care must be taken meanwhile that no deposition of salt takes place on the sides of the retort above the level of the liquid, and before removing the lamp the current of gas must be increased, so that air may not enter through the U tube. The determination of the residual protochloride of iron is then made as usual with permanganate solution.

The following results were obtained in this way :—

	1.	2.	3.	4.
Iron in retort	1.1223	1.5950	1.4403	1.3722 grm.
Nitrate used.....	0.3742	0.2693	0.2585	0.2454 "
Permanganate solution required for residual protosalt	62.35	78.05	68.75	65.45 cub. cent.
Iron, equivalent to 100 permang. solution ...	0.8010	1.470	1.470	1.470 grm.

These experiments gave the following results instead of 100 :—

1.	2.	3.	4.
100.1	100.03	100.03	100.57

and consequently the method appears to be applicable with perfect certainty.

Production of Alcohols, Acids, and Glycerides from Sugar.—M. Maumene* has put forward a theory of the production of alcohols belonging to the ethyl, propyl, butyl, and capronyl series. The production of the methyl and amyl alcohols could not be represented in an analogous manner, and hence M. Maumene was led on the one hand to account for the absence of methyl alcohol among the products of fermentation, and on the other, to infer that amyl alcohol is the product of another process than fermentation, while the propyl, butyl, and capronyl alcohols are regarded as direct products of fermentation.

Hr. C. Boedeker† offers some remarks on this theory which he believes are sufficient to show that it cannot be maintained, and which are in other respects interesting :—

Production of Alcohols from Sugar.—It was long regarded as determined that the result of the alcoholic fermentation of sugar C_{12} H_{12} O_{12}, consists in the separation of one-third of the carbon and two-thirds of the oxygen as carbonic acid, while the whole of the hydrogen combined with two-thirds of the carbon and one-third of the oxygen yielding alcohol. The investigations of Dumas, Balard, and Cahours, in reference to fusel oil showed that this was not altogether the case, and led to the opinion that in the fermentation of sugar with yeast, amyl alcohol might be produced, together with ethyl alcohol under certain circumstances.

In 1852, Wurtz showed that the alcohol of the butyl series C_8 H_{10} O_2, was a third product of vinous fermentation.

A year afterwards, Chancel obtained as a fourth product of this fermentation the propyl alcohol C_6 H_8 O_2, and in the same year Faget obtained the capronyl alcohol, C_{12} H_{14} O_2, from the fusel oil of brandy prepared from the marc of grapes.

It would be somewhat venturesome to suppose these are the only alcohols that can possibly be produced by vinous fermentation of sugar with yeast. But in any

* *Comptes Rendus*, xlv., 1021. † *Annalen der Chemie und Pharmacie*, cvi., 172.

case it is questionable whether a theory that accounts for the production of propyl, butyl, and capronyl alcohols, but excludes amyl alcohol from the series of direct products of this fermentation, can be correct. So long as there are neither experimental nor theoretical grounds for the opinion that the several alcohols are produced in different ways, that view of their origin which is the most simple must be adopted.

The production of all alcohols that have a composition corresponding to the general formula $C_{2m}\ H_{2m}+_2\ O_2$, may be most simply represented as follows:—

$$3\ C_m\ H_m\ O_m = C_{2m}\ H_{2m}+_2\ O_2+ m\ CO_2+ (m-2)\ HO.$$

In the place of m the whole numbers may increase from 1, as in the case of methyl alcohol, to 30, as in meliosyl alcohol.

Applying this general formula to the several alcohols, their production may be represented uniformly, but this is not the case as regards methyl alcohol, which, though not recognized as a product of the fermentation of sugar, is produced by the dry distillation of cellulose, a substance closely related to sugar. In the case of this alcohol, which contains only two equivalents of carbon, the value of m would be 1, so that, according to the above formula, the production of methyl alcohol from sugar would be represented by

$$m = 1 : \text{methyl alcohol } C_3\ H_3\ O_3 = C_2\ H_4\ O_2 + 1\ CO_2\ HO.$$

In this case there would be a combination of the elements of water with the sugar instead of a separation, and this necessity appears to be the reason why no methyl alcohol is produced in the fermentation of sugar, inasmuch as the influence of yeast upon sugar consists the production of a separation, and not a combination.

The production of different kinds of alcohol from grape sugar is regarded by Hr. Boedeker as the result of a polymeric alteration of the sugar in such a manner that, for instance, in the production of amyl alcohol, five quivalents $C_{60}\ H_{60}\ O_{60}$ are converted into four fermentation groups $C_{15}\ H_{15}\ O_{15}$, which yield 5 CO_2 3 HO, and amyl alcohol $C_{10}\ H_{12}\ O_2$, the nature of the alcohol depending upon the nature of the polymetric alteration, and upon the nature of the fermentation groups produced by it. When the four fermentation groups are formed from two equivalents of sugar, ethyl alcohol is produced, when they are formed from four equivalents, butyl alcohol, and so on.

Preparation of Basic Acetate of Lead.—Prof. Rochleder* states, that when a silver vessel is used for the solution of oxide of lead in acetate of lead, the production of the basic salt takes place much more rapidly than when it is heated in glass, porcelain, or tinned vessels. The solution of the oxide of lead is almost instantaneous, so that considerable quantities may be prepared in a short time, even with a small silver basin.

Cinchona Bark of New Granada.—Hr. Karsten† states that, by numerous comparative analyses of the yellow bark of *Cinchona lancifolia*, Mut., as well as grey Loxa bark, *C. corymbosa* made upon the spot, he has arrived at the conclusion that the amount of organic bases in the bark is subject to great variations, according to the place where the trees grow, and that this is probably more the result of differences of climate than of soil. The bark of *C. lancifolia*, which, on the average, yields 2.5 per cent. sulphate of quinine, and from 1 to 1.5 per cent. sulphate of cinchonine, often yields neither alkaloid, and sometimes yields 4.5 per cent. The bark of young branches of *C. lancifolia* was found not to yield any alkaloid, although the bark of the stem yielded 1.25 per cent. sulphate of quinine and 0.25 per cent. sulphate of cinchonine.

Hr. Karsten considers that the quinine produced in plants is again absorbed in the process of vegetation when the supply of nutriment to the plant is cut off or diminished. Thus the bark of a tree which yielded 3.5 per cent. sulphate of quinine when fresh felled, yielded only 3 per cent. after it had been kept six months, during which time the bark of the tree remained upon it perfectly fresh.

The conditions that are considered by Hr. Karsten as most favourable to the production of a large amount of organic bases in cinchona bark, are constant uniformity of climate, with alternating cloudy, sunny, and rainy weather, while those species

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* *Sitzungsber der Akad. der Wissench zu Wien*, xxiv., 38.

† *Bericht der Akad. der Wissench zu Berlin*, 1858, p. 260.

that grow in variable climates, with intermittent periods of vegetation, furnish bark that contains a smaller amount of alkaloids.

Caprylic Alcohol and Caprylic Aldehyde.—Some time since, Städeler published the results of some experiments which seemed to show that caprylic aldehyde is an acetone—methyl-œnanthol. But it may not be so certain that by the distillation of castor oil with potash œnanthyl-alcohol is produced, and not capryl-alcohol, although Städeler's analyses give numbers that agree very closely with the formula of œnanthyl-alcohol. There are, however, numerous analyses by other chemists, both of the pure alcohol and of its derivatives, which all lead to the formulæ of the capryl series.

Hr. Dachauer* has more recently obtained methyl-œnanthol and capryl-alcohol by the distillation of castor oil with potash. The portion that passed over between 174° and 178° C. was immediately treated with chloride of phosphorus, the distillate washed with water, and again distilled, so as to separate the portion boiling between 171° and 175° C. The analysis of this product gave—

		Calculated according to the formulæ $C_{16}H_{17}Cl$.	$C_{14}H_{15}Cl$.
Carbon	64.1	64.4	62.2
Hydrogen	11.5	11.4	11.1
Oxygen	23.9	24.4	26.7
	99.5	100.0	100.0

Capryl-alcohol, separated from the methyl-œnanthol by means of bisulphite of soda, dissolves sodium copiously; the amber yellow mass becomes heated by mixture with chloride of acetyl, deposits chloride of sodium, and, when covered with water, is converted into a thin liquid which, when dehydrated by repeated rectification, attains a constant boiling point of from 191° to 192°. This was aceto-caprylic ether, $C_{20}H_{20}O_4$, and gave on analysis—

		Calculated according to the formulæ $C_{20}H_{20}O_4$.	$C_{18}H_{18}O_4$.
Carbon	70.0	69.7	68.4
Hydrogen	11.9	11.6	11.4
Oxygen	—	18.7	20.2
		100.0	100.0

Caprylic-alcohol gave on analysis—

		Calculated according to the formulæ $C_{16}H_{18}O_2$.	$C_{14}H_{16}O_2$.
Carbon	73.8	73.8	72.4
Hydrogen	13.9	13.8	13.8
Oxygen	—	12.4	13.8
		100.0	100.0

When the methyl-œnanthol is distilled with chloride of phosphorus, the distillate mixed with water, and the insoluble oil distilled off, the greater part passes over between 190° and 200°. The amount of chlorine was 38.9 per cent., and that required by the formula $C_{16}H_{16}Cl_2$ is 39.1 per cent.

The same compound, with the same boiling point, was obtained from caprylene, $C_{16}H_{16}$, by the action of chlorine upon caprylene floating on water. The correspondence of these two substances of different origin, as regards the boiling point, is remarkable, because the isomeric compounds obtained from aldehydes and from hydrocarbons have generally different boiling points.

Production of Organic Substances without the agency of Vitality.—The difference between the two classes of substances hitherto recognized by Chemists was indicated by well-marked and obvious peculiarities. Those belonging to the mineral kingdom were distinguished by their chemical stability, and by the facility with which the greater number of them could be artificially produced from elementary substances. Those of the other class were found exclusively in the animate portion of creation, or were directly derived from the products of the organs of

* *Annalen der Chemie und Pharmacie*, cvi. 269.

plants and of animals, and were distinguished by their proneness to undergo change, and by the impossibility of producing them by artificial means. By no processes then known to chemists could the elementary substances be made to unite, so as to produce compounds, either identical with, or analogous to, the substances generated by the organs of plants and of animals. These substances were consequently, from their origin, termed *organic*. They were regarded as dependent for their origin upon the influence of that aggregate of conditions sometimes called *vital force;* and it was generally believed that we should never succeed in producing these substances artificially, unless we could form and endow with vitality the organs from which they were derived.

Such was the state of knowledge and opinion until the year 1828, when Wöhler succeeded in artificially producing *urea*, a substance which had up to that time been known only as a product of the animal organism. This discovery was followed many years later by the artificial formation of acetic acid, which was produced by Kolbe from a mixture of protochloride of carbon, water, and chlorine exposed to sunlight, the chloracetic acid thus obtained being afterwards converted into acetic acid by reaction with amalgam of potassium. The subsequent production of methyl by the same chemist from acetic acid, added one of the organic radicals to the list of compounds producible from their elements. Little further progress was made for several years in this department of chemical research, but the artificial production of urea and acetic acid, together with their derivatives, had completely broken down the barrier between so-called "organic" and "inorganic" substances, and although the name "organic" was still retained for the class of compounds to which it had previously been assigned, it was obviously no longer strictly applicable.

The recent ingenious researches of M. Bethelot have greatly extended this branch of chemical inquiry, and have, in a most important degree, increased the number of substances capable of artificial formation. The production of chloride of methyl and the members of the olefiant gas family up to amylene (C_{10} H_{10}) furnish us with the whole series of alcohols and their derivatives, from amylic alcohol downwards. Phenylic alcohol and napthaline, both artificially produced by Berthelot, yield a host of interesting bodies; whilst phenylcarbamic acid enables us to step from the phenylic to the salicylic group, since, when treated with hyponitrous acid, it yields salicylic acid. Lastly, M. Berthelot has succeeded in artificially forming glycerine, the basis of animal and vegetable oils and fats, and also in forming grape-sugar; the latter, however, is obtained by the contact of glycerine with putrifying animal substance, and consequently cannot be said to be produced altogether without the agency of vitality; although the putrifying organic substance contributes none of its constituents to the new compound, and does not undergo any appreciable change in weight or appearance during the process. These substances yield such a numerous class of derivatives, that upwards of 700 distinct organic compounds can now be produced from their elements without the agency of vitality.

However, the processes employed for the artificial production of these compounds present little or no analogy to the natural mode by which organic compounds are formed in the tissues of plants, but Dr. Frankland endeavoured to show that a close attention to the nature of the inorganic materials assimilated by the vegetable kingdom, and their relations to the more important organic compounds derived from plants, leads to the belief that such compounds can be successfully produced by processes strictly analogous to those employed by nature. As an illustration of this he referred to the so-called organo-metallic compounds—in which the production of organic from inorganic substances by the replacement of elements by organic groups can be so clearly traced—as affording a valuable clue to the formation of organic bodies in general, and leading directly to the conclusion, that if the organic compounds of the metals be formed upon the model of the oxides of the respective metals, the organic compounds of carbon (that is all organic compounds) are formed upon the model of the oxides of carbon.

It has long been known that, with slight and unimportant exceptions, the only materials employed by nature in the construction of the most complex organic compounds are carbonic acid, water, ammonia, and nitric acid. The fact that a vast number of organic compounds are cast in the molecular mould of water, has been proved by the ingenious researches of Williamson and Gerhardt; whilst the wonderful fertility of the ammonia model has been amply demonstrated by the labours of Hofmann and Wurtz; and it would not be difficult to prove the claim of

nitric acid to be considered as a third model, upon which a number of other organic compounds are built up.

Guided by the constitution of the organo-metallic compounds, and bearing in mind the replacibility of the oxygen in water and binoxide of nitrogen, as well as the chlorine in terchloride of phosphorus, by organic radicals, Professors Kolbe and Frankland formed the following conclusions with regard to the constitution of several classes of organic compounds:—

1. That the replacement of one atom of oxygen in carbonic acid by hydrogen, or its homologues, produces an organic acid, either of the fatty or of the aromatic series, thus:—

Carbonic Acid. $C_2 \begin{cases} O \\ O \\ O \\ O \end{cases}$ Acetic Acid. $C_2 \begin{cases} (C_2 H_3) \\ O \\ O \\ O \end{cases}$ Benzoic Acid. $C_2 \begin{cases} (C_{12} H_5) \\ O \\ O \\ O \end{cases}$

2. That the like replacement of two atoms of oxygen in carbonic acid produces either a ketone or an aldehyde, thus:—

Carbonic Acid, $C_2 \begin{cases} O \\ O \\ O \\ O \end{cases}$ Acetone. $O_2 \begin{cases} (C_2 H_3) \\ (C_2 H_3) \\ O \\ O \end{cases}$ Aldehyde. $C_2 \begin{cases} C_2 H_3 \\ H \\ O \\ O \end{cases}$ Oil of Bitter Almonds. $C_2 \begin{cases} C_{12} H_5 \\ H \\ O \\ O \end{cases}$

3. That the like replacement of three atoms of oxygen in carbonic acid produces an ether, thus:—

Carbonic Acid. $C_2 \begin{cases} O \\ O \\ O \\ O \end{cases}$ Vinic Ether. $C_2 \begin{cases} C_2 H_3 \\ H \\ H \\ O \end{cases}$

4. That the like replacement of all the atoms of oxygen in carbonic acid produces a radical, a hydride of a radical, or a double radical, thus:—

Carbonic Acid. $C_2 \begin{cases} O \\ O \\ O \\ O \end{cases}$ Ethyl. $C_2 \begin{cases} C_2 H_3 \\ H \\ H \\ C_4 H_5 \end{cases}$ Hydride of Methyl (Fire Damp.) $C_2 \begin{cases} H \\ H \\ H \\ H \end{cases}$ Methyl-Ethyl. $C_2 \begin{cases} C_2 H_3 \\ H \\ H \\ C_2 H_3 \end{cases}$

In attempting to verify these conclusions by direct experiment, advantage was taken of the powerful affinities of zincethyl, so as to effect the substitution of oxygen in carbonic acid, and sulphur in bisulphide of carbon, by ethyl; these attempts were only partially successful, the reaction between these compounds was not sufficiently powerful to rival the action of plants in the decomposition of carbonic acid. However, Mr. Wanklin, in his newly-discovered sodium and potassium compounds of the organic radicals, came into possession of re-agents which enabled him at once to effect the desired substitutions. His memoir on the production of propionic acid by the action of sodium-ethyl upon carbonic acid, which has just been communicated to the Chemical Society, proves the first proposition of an hypothesis which considerably simplifies our views of the molecular structure of organic compounds, and which, if proved to be throughout correct, cannot fail to enable us greatly to increase the number of organic compounds capable of being procured from their elements without the intervention of vitality.

Among the substances capable of artificial formation from their elements, are—

Name.	Formula.
Oxalic acid	$(C_2 O_3, HO)_2$
Hydrocyanic acid	$C_2 N, H$
Light carburetted hydrogen	$C_2 H_4$
Urea	$C_2 N_2 H_4 O_2$
Formic acid (acid of ants)	$C_2 H O_3, H O$
Chloroform	$C_2 H Cl_3$
Acetic acid	$C_4 H_3 O_3, H O$
Alcohol	$C_4 H_5 O, H O$

Name.	Formula.
Ether	$(C_4 H_5 O)_2$
Olefiant gas	$C_4 H_4$
Acetic ether	$C_4 H_5 O, C_4 H_3 O_3$
Oil of garlic	$(C_6 H_5 S)_2$
Oil of mustard	$C_6 H_5 S, C_2 N S$
Glycerine	$C_6 H_8 O_6$
Butyric acid	$C_8 H_7 O_3, H O$
Pine apple flavour (butyric ether)	$C_8 H_7 O_3, C_4 H_5 O$
Succinic acid	$C_8 H_4 O_6, 2 H O$
Valerianic acid	$C_{10} H_9 O_3, H O$
Pear flavour (acetate of amyl)	$C_4 H_3 O_3, C_{10} H_{11} O$
Apple flavour (valerianate of amyl)	$C_{10} H_9 O_3, C_{10} H_{11} O$.
Lactic acid	$C_{12} H_{12} O_{12}$
Grape sugar?	$C_{12} H_{12} O_{12}$
Caproic acid	$C_{12} H_{11} O_3, H O$
Benzole	$C_{12} H_6$
Nitrobenzole	$C_{12} H_5 N O_4$
Aniline	$N (C_{12} H_5) H_2$
Phenyl alcohol (creosote)	$C_{12} H_5 O, H O$
Picric acid	$C_{12} H_2 (N O_4)_3 O, H O$
Salicylic acid	$C_{14} H_5 O_5, H O$
Salicylate of methyl (oil of wintergreen)	$C_{14} H_5 O_5, C_2 H_3 O$
Naphthaline	$C_{20} H_8$

The artificial formation of urea, lactic acid, and caproic acid, is interesting in connexion with certain functions of the animal economy. Pine-apple oil, pear oil, and apple oil, are instances of the artificial production of the delicate flavours of fruit, whilst oil of wintergreen and nitrobenzole are like examples of the formation of esteemed perfumes. But of all the bodies hitherto thus produced, alcohol, glycerine, and sugar, are undoubtedly the most deeply interesting, owing to the part they take in the nutrition of animals: they prove to us the possibility of producing, without vegetation or any vital intervention, an important part of the food of man. Should the chemist also succeed in forming artificially the nitrogenous constituents of food, without which life cannot be maintained, it would then be possible for a man, placed upon a barren rock, and furnished with the necessary apparatus and inorganic materials, to support life entirely without either animal or vegetable food. No one of these nitrogenous constituents has, however, yet been artificially produced, and the absence of all clue to their rational constitution forms at present a formidable barrier to their non-vital formation.

At present, the possibility of economically replacing natural processes by artificial ones in the formation of organic compounds, only attains to probability in the case of rare and exceptional products of animal and vegetable life. Thus valerianic acid, which for a long time was extracted from the root of the *Valeriana officinalis*, could now probably be more cheaply prepared from its elements; but a still cheaper source of this acid has been in the mean time discovered, viz., the oxidation of amylic alcohol, a waste product formed in the manufacture of spirit of wine, and obtainable at such a moderate cost as to prevent, in an economical point of view, the successful production either of amylic alcohol or valerianic acid by any artificial and exclusively non-vital processes at present known. It is also highly probable, that if we could produce artificially such bodies as quinine and the rare alkaloids, or alizarine, and similar powerful and valuable organic colouring matters, we should be able to compete with organic life in the formation of these bodies; nevertheless, the discovery of the processes of artificial formation would doubtless be preceded by a knowledge of methods, by which such rare bodies could be produced from more abundant, and consequently cheaper forms of vegetable or animal matter; and it is therefore exceedingly improbable that any purely non-vital process will be successfully, and at the same time economically employed for the manufacture even of such rare and valuable vital products. Such being the economical bearings of the case with regard to the rare and exceptional educts of vitality, when we turn to consider the great staple products of the animal and vegetable kingdoms, the hope of rivalling natural processes becomes faint indeed. By no processes at present known could we produce sugar, glycerine, or alcohol from their elements, at one hundred times their

present cost as obtained through the agency of vitality. But, although our present prospects of rivalling vital processes in the economical production of staple organic compounds, such as those constituting the food of man, are so exceedingly slight, yet it would be rash to pronounce their ultimate realization impossible. It must be remembered, that this branch of chemistry is as yet in its merest infancy, and that it has hitherto attracted the attention of few minds; and further, that many analogous substitutions of artificial for natural processes have been achieved. Thus, under certain circumstances, we find it less economical to propel our ships by the force of the wind, and our carriages by animal power, than to employ steam power for these purposes. We do not find it desirable to wait for the bleaching of our calicoes by the sun's rays; and even the grinding of corn is no longer entirely confided to wind and water power.

In such cases, where contemporaneous natural agencies have been superseded, we have almost invariably drawn upon that grand store of force collected by the plants of bygone ages, and conserved in our coal-fields. It is the solar heat of a past epoch that furnishes the power which we now utilize in our steam-engines. One important element in cheap production is *time*, and it is precisely in regard to this element that we economically supersede, in the above instances, the contemporary resources of nature. Now time is also an important element in the natural production of food; and although it is true that the amount of labour required for the production of a given weight of food is not considerable, yet it is nevertheless true that this weight requires a whole year for its production. By the vital process of producing food we can only have one harvest in each year. But if we were able to form that food from its elements without vital agency, there would be nothing to prevent us from obtaining a harvest every week; and thus we might, in the production of food, supersede the present vital agencies of nature, as we have already done in other cases, by laying under contribution the accumulated forces of past ages, which would thus enable us to obtain in a small manufactory, and in a few days, effects which can be realized from present natural agencies, only when they are exerted upon vast areas of land, and through considerable periods of time.

THE INFLUENCE OF LIQUOR POTASSÆ AND OTHER FIXED CAUSTIC ALKALIES UPON THE THERAPEUTIC PROPERTIES OF HENBANE, BELLADONNA, AND STRAMONIUM.*

BY DR. A. B. GARROD.

The object of this second communication was—

1. To prove that the active principles of the plants under consideration are absolutely destroyed by the influence of the caustic alkalies.
2. To show the ratio which must exist between the different preparations of the plants and the alkalies for the neutralization to be perfect.
3. To ascertain the time demanded for the decomposition to be complete.
4. To illustrate clinically the influence of the alkali in preventing the occurrence of symptoms, and removing such when large medicinal doses of these solanaceous drugs are administered.

Dr. Garrod, before proceeding to discuss these various heads, brought under notice a few points relating to the nature of liquor potassæ, and the properties of some of the officinal preparations of henbane, &c., showing that the former, although strongly caustic, still possessed but little neutralizing power, containing so small an amount of potash—not more than 6.7 per cent.; and that most of the preparations of henbane, belladonna, and stramonium, as the tinctures and extracts, were strongly acid in reaction, and hence, before the alkali could act upon the active principles contained in them, it must first neutralize this acidity, next separate the alkaloids from the acids with which they naturally are combined in the plants; that, therefore, much more was required (measured by the physiological or therapeutic strength of the drugs) to neutralize the galenical preparations than their alkaloids, or the active principles themselves. To prove that the active principles were absolutely destroyed by the alkali, he (Dr. Garrod) performed several experiments in the following manner:—A solution of atropine was made by dissolving it in water with the aid of

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* See vol. xvii., page 462.

a little spirit, dividing the solution into two parts, adding to one some carbonate of potash, to the other a sufficiency of liquor potassæ, and permitting both to remain for some hours. Chloroform was afterwards well shaken with both solutions, and allowed to subside, the supernatant fluid being poured off, and the chloroform washed with a little distilled water. Each portion was evaporated spontaneously in glass dishes. From the solution, to which carbonate of potash had been added, a gummy matter was obtained (soon, however, becoming crystalline), a solution of which dilated the pupil intensely; and when acidulated with hydrochloric acid, and chloride of gold dropped in, gave rise to the beautiful plumose crystals of the double chloride of gold and atropine. From the second solution, that to which liquor potassæ had been added, a strong-smelling substance was left, on the evaporation of the chloroform, having no power of dilating the pupil, and giving rise to no crystallization with the gold salt. These experiments demonstrated beyond doubt the absolute destructive agency of the caustic alkali upon the active principles. It was also shown that most other alkaloids, as morphia, quinine, cinchonine, &c., were not so destroyed. To show the ratio which must exist between the different preparations of the plants and the fixed alkali, in order that neutralization may be perfect, Dr. Garrod gave the results of more than sixty experiments and observations in a tabular form, from which it appeared that when atropine is acted upon by liquor potassæ, the destructive influence of the latter is so great, that less than twenty minims are required to neutralize one grain of the former, and that probably pure potash will destroy its own weight of atropine. That when belladonna preparations are employed, the power of the potash becomes weakened, from the causes above alluded to—namely, the natural acidity of the drugs, and the necessity of first displacing the alkaloid from the acid with which it is combined; still, however, it was shown by the table that fifteen minims of liquor potassæ will destroy a fluid drachm of the tincture, and that twenty-five minims are sufficient to produce the same change in five grains of the extract; at once demonstrating that quantities very greatly beyond the medicinal doses of these drugs—indeed, even poisonous amounts—are rendered quite inert by very moderate addition of the alkaline solution. The same was found to hold good in the case of daturine and the preparations of stramonium. Ten minims of liquor potassæ will neutralize a drachm of tincture of henbane, and thirty minims destroy nine grains of extract of henbane, although when ten grains are employed, dilatation will often ensue from a small portion of the extract, less than one grain being left free; and it should be observed that a very minute proportion of these preparations is amply sufficient to induce the effect. Of course these extracts and tinctures are liable to variation in strength, acidity, &c., circumstances which must necessarily produce an alteration in the requisite amounts of liquor potassæ required for complete neutralization. With even the best extract, however, procured from one of the first Druggists in town, it was found that nine grains were destroyed by the above-named quantity of potash. Nine grains of good extract of henbane and three fluid drachms of good tincture of the same may be considered as doses of the drugs which few practitioners would prescribe; yet these are destroyed by thirty minims of liquor potassæ, proving beyond all doubt, that in the proportions prescribed in actual practice, a total neutralization of effect ensues. To ascertain the required time, Dr. Garrod made experiments with solutions of atropine, and commenced the observation shortly after the addition of the potash. In an hour and a half the effect on the pupil was much diminished, and in two hours and a half ceased altogether. The influence of the alkali in preventing the occurrence of symptoms, and removing the same when large medicinal doses of these solanaceous drugs are administered, was clinically illustrated by the narration of several cases, in which, after very decided effects had been induced by henbane or belladonna preparations, the addition of a very small quantity of liquor potassæ to the draught (the patient continuing the other drugs) quickly caused the cessation of the symptoms; and again, other instances where the withdrawal of the liquor potassæ from a combination was followed by the occurrence of powerful symptoms. From these observations and experiments, Dr. Garrod concluded that the liquor potassæ possessed the peculiar power of destroying the active principles of henbane, belladonna, and stramonium, even when in very dilute solutions, and that the combinations frequently prescribed are utterly incompatible both in a chemical and therapeutical point of view.

In answer to Dr. O'Connor,

Dr. Garrod stated that he had not tried the effect of heat in his experiments, but

he had no doubt that an increase of temperature would increase the rapidity of decomposition.

Dr. O'Connor said he had observed for a long time past the facts stated by Dr. Garrod; and that it had been distinctly stated by Geigar, on the authority of Liebig, that atropa, stramonium, and hyoscyamia were decomposed by fixed alkalies, and that on the application of heat the decomposition was more rapidly effected. From having read the statement of Liebig some twelve or thirteen years ago, he had never since ordered fixed alkalies in combination with either of those preparations.

Dr. Garrod said he had enumerated in his paper the works in which the statement had been made, that alkalies had the power of destroying the active principles of henbane. He claimed no originality in the matter, but simply the merit of having brought the subject prominently forward, at a time when, notwithstanding the statements of several authors, Medical men were constantly in the habit of prescribing medicines which had the power of completely neutralizing each other.—*Medical Times and Gazette.*

IODATE OF POTASH.

Messrs. Demarquay and Custin consider that the action of this salt is more powerful than that of the chlorate of the same base, and that it has yielded excellent results where the chlorate of potash had failed. The dose varies from five to twenty-two grains, and it has been used in diphtheritis, mercurial and gangrenous stomatitis, &c. From M. Millon's directions, the salt may be obtained as follows:—One part of iodine and one of chlorate of potash are brought in contact with six parts of boiling water, acidulated with a few drops of nitric acid. When chlorine ceases to be given off, a concentrated solution of chloride of barium is added to the liquor. The washed iodate of barytes is then decomposed by sulphuric acid, the sulphate of barytes is separated by filtration, and the fluid is slowly evaporated. The crystals of iodic acid are then washed with distilled water, redissolved in boiling distilled water, and the solution saturated with bicarbonate of potash. A great portion of the salt is deposited in little crystals on cooling.—*Lancet.*

THE PROCESS OF PERCOLATION.

BY EDWARD R. SQUIBB, M.D.

The Pharmacopœia very judiciously recommends that the process of percolation be restricted to the practice of those who may have had experience or instruction in manipulation. This restriction is rendered necessary by the circumstance that in the application of the process a very little bad management is liable to produce imperfect results, and be wasteful. The facility and great convenience of the process has, however, led to its general adoption, regardless of the wholesome restriction, and it now only remains to be seen whether, by simple means, its general application may not be established without risk of bad results.

In the practice of percolation for some years past, the writer has, from time to time, observed results which have led to the adoption of a few simple rules in the management of the process. And as these rules, if observed with ordinary care, render the process quite as certain as that by maceration, in any hands, they are communicated in the hope of being of some value.

Substances to be exhausted by percolation should generally be so comminuted as to pass through a sieve of twenty-four meshes to the linear inch.

The substance should be wetted with the menstruum until the liquid is no longer absorbed by the powder, and should then stand in a covered vessel for twelve hours before being put into the percolator.

The percolator should have a height equal to four times its diameter, at least, and should be furnished at the lower end with a stop-cock, or india-rubber tube, by which to regulate the rate of percolation. Upon the perforated diaphragm of the lower part should be placed two disks of flannel, with a disk of filtering paper between them.

The wetted substance should be put into the percolator compactly, but not tightly, so as to occupy about five-sixths of the capacity of the percolator, and be covered by a disk of flannel tucked down round the edges.

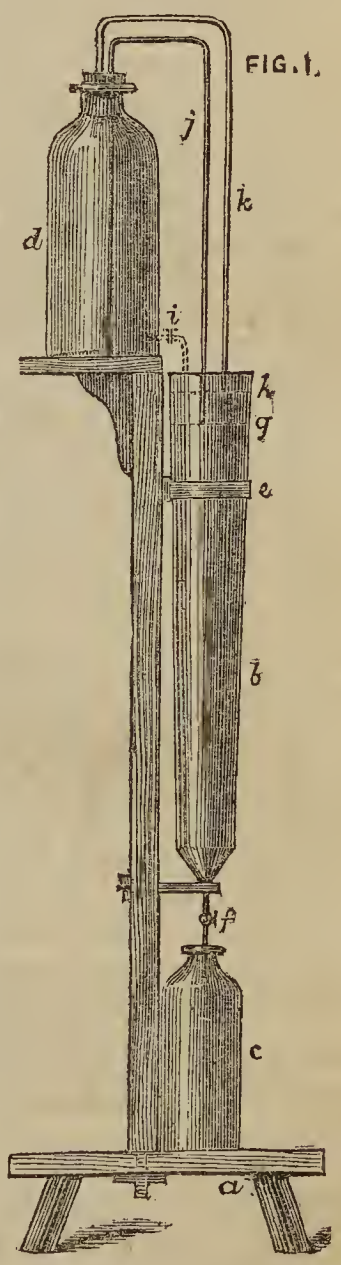
There should be a stratum of menstruum kept upon the substance in the percolator, until the whole of the prescribed quantity of liquid has been added.

The rate of percolation should be so controlled that in percolating one pound of substance the percolate should drop into the receiver at the rate of one drop every two seconds, or about three f. ℥ per hour; and for larger quantities in the same ratio.

The first and last of these simple rules are most important, and if carefully observed will furnish good and equable preparations. The controlling the rate of percolation proved to be so important to the process, that the writer very soon abandoned the attempt to do this by the mere packing of the substance in the percolator; whilst the alternative adopted for the purpose in a great measure obviates the necessity for the skill and judgment necessary in manipulating each particular drug. The most common faults in percolation are in having the substances too coarsely powdered, and in percolating too rapidly.

By attention to the rules above given, and by the adaptation of a few little simple contrivances (which any one can make for himself), such as are shown in the adjoining sketches, the process has become in the writer's hands so convenient, easy, and so automatic, that it has ceased to require or attract any particular attention.

Figure 1 is a centre section sketch of an automatic percolator, which the writer has for some time had in use, drawn on a scale of half an inch to the foot.



a is a stand for the receiving vessel. Into the stand is secured, by mortise tenon and pin, an upright of two by four-inch plank, to support the percolator. On the upper end of this, supported by what mechanics call an o g bracket, is a small shelf or platform for the menstruum reservoir.

b is the percolator, supported upon a perforated bracket at the lower end, and attached to the upright support at the upper part by a strap and buckle, *e*. Into the lower opening a small glass stop-cock, *f*, is fitted by means of a perforated cork. This stop-cock may, without inconvenience, be replaced by two short pieces of glass tube, and an inch of india-rubber tubing of corresponding size. One piece of the glass tube is fitted to the percolator by a perforated cork, at one of its ends. The india-rubber tube is then stretched over the other end of this first glass tube, while the second piece of glass tube is inserted into the india-rubber tube below. A piece of thread being then tied loosely round the india-rubber portion, may be made into a good compression stop-cock, by inserting a little wedge of wood between it and the india-rubber tube. The farther this wedge is pushed in, the more it contracts the tube. The lower piece of glass tube may be dispensed with, but the contrivance is not so neat. Where this tube enters the receiving bottle, it should be tied round with paper or muslin, to prevent loss by evaporation.

The upper end of the percolator should be tied over with sheet india-rubber, in which two holes have been made for the tubes.

d is the menstruum reservoir, large enough to hold an entire charge of menstruum. It is fitted with a good cork, and two syphon tubes that pass into it air tight. The inner syphon, *j*, is small, and passes from near the bottom of the bottle to near the surface of the substance in the percolator, so that both its ends may be always immersed while in action. It conveys the liquid from the reservoir to the percolator upon the principle of a syphon, but can only act as air is admitted to the reservoir.

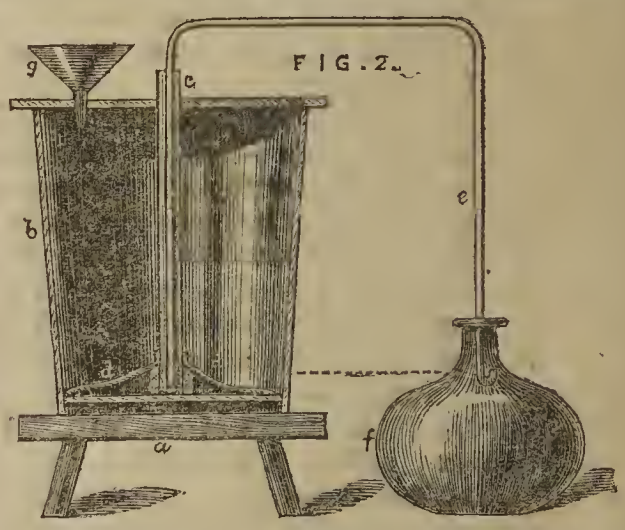
The second tube, *k*, is of much larger calibre. If less than four to six lines diameter it works badly, while if less than three lines it does not do at all. This tube should be about half inch bore, no matter what scale the apparatus is on. It passes from the neck of the reservoir bottle, air tight, through the cork, and down into the percolator, terminating by an oblique or pen-shaped end, about one inch above the end of the syphon for feeding. This large

tube is for supplying and for limiting the supply of air to the reservoir, and this it is which renders the apparatus automatic. The reservoir being filled and set upon its support, and the percolator ready, the reservoir is tilted backward and air blown through the large tube. This immediately starts the feeding syphon, when the reservoir is allowed to take its proper position, and the apparatus abandoned to itself. The feeding syphon will run until the substance is fully saturated, and until the stratum of menstruum above it rises high enough to close the end of the large air tube. This liquid then of course shuts off the air from the reservoir, and as soon as the columns of liquid balance each other, the feeding syphon stops. The stop-cock, *f*, at the receiver, is now carefully adjusted to the proper rate of percolation, and the apparatus left to take care of itself. As soon as, by percolation, the stratum of liquid above the substance falls so as to expose the upper part of the opening at the end of the large air tube, a bubble of air passes up into the reservoir, and a corresponding bulk of the menstruum flows out through the syphon tube, and this action is kept up so long as there may be any menstruum in the reservoir.

The feeding syphon, *j*, may be replaced by a stop-cock, *i*, as shown by dotted lines, but vessels with stop-cocks are very expensive, and no better than those which are plain, and arranged with a syphon. The pendant portions of both the tubes from the reservoir may be of india-rubber tubing, and as it is only this portion of the air tube that need be so large, it is very convenient to arrange it thus: slipping the larger india-rubber portion over the smaller glass portion.

With a four-gallon reservoir of menstruum, and a receiver of corresponding size, this apparatus will take care of itself until the process is finished; and the writer, in a slow percolation, for saturated tinctures, for instance, has often had it to run on eight or nine days untouched.

Another convenient form of percolator, which the writer contrived, and has often used on various scales from a quart specie jar up to a hogshead, has some advantages, particularly on the large scale, as where a barrel of menstruum is to be used as in exhausting sarsaparilla, &c., for compound syrup. Figure 2 represents this arrangement of apparatus, except that it is not necessary to represent the feeding reservoir. Where the supplying arrangement of the last drawing is used, it is done simply by mounting the barrel of menstruum upon a proper stand above the level of the cover of the percolator, and then adapting the large india-rubber air tube to the bung-hole, and putting an ordinary faucet in any low portion of the barrel; or, more simply, as the writer has done, by using a small india-rubber tube for a feeding syphon, inside of the large one for air, allowing the small one to project two inches below the larger one, where they pass through the funnel opening at *g*; and ensuring, by a weight attached, that the other end of the small tube goes to the bottom of the barrel. By this simple, easy arrangement, any operation of percolation or washing may be performed at any rate of speed or to any desirable extent.



a is a simple stool, upon which stands the tub or other percolator vessel, *b*; and it matters not whether this vessel be a specie jar or a mixing tun.

c is a tube standing erect in the centre of the vessel, and, upon the scale of the drawing, of about two inches diameter. This tube, if of metal, has about one inch of its lower extremity perforated with holes; or, if of glass, simply broken off irregularly. Around the lower end of this, a ball of clean tow or straw is wound rather loosely. Over the tow and end of the tube the centre of a large disk of blanket is passed, and tied firmly round the tube a little above the tow or straw. The blanket is then reflected out over the bottom of the tub, where it forms a stratum for conducting the percolate, as shown at *d*. The wetted substance to be percolated is then filled into the tub upon this blanket and around the tube, and packed equally. The menstruum being then admitted through the funnel opening in the cover at *g*, saturates and percolates the substance, and passes into the tube or

well, *c*, rising to the same level in the well that it is in the tub outside. The remainder of the contrivance consists in the means of drawing off this percolate from the well by a syphon that shall never empty itself, and of regulating the rate at which this is accomplished. The syphon, *e*, may be of glass or metal, or what is much better, of india-rubber tubing. It should pass from the bottom of the well inside the tub to a little below the bottom of the tub outside, and the outer end should be furnished with a small piece of glass tube bent in the form of a U. Until all the menstruum has been added, the free extremity of this U should be kept at about the level of the substance in the tub, or a little lower, if the rate be regulated by a string and wedge. But when all the menstruum has been added, it must be dropped down below the bottom of the tub. By the U shaped end, this little syphon is prevented from emptying itself, so long as there is liquid in the well, no matter at what level it may be kept, and it may be made to keep the well entirely exhausted of percolate if desired, or to keep it at any given level. Indeed, in all respects, there can hardly be a more manageable or convenient arrangement than this, whether for operations on the large or small scale, and it may be recommended as the cheapest as well as most convenient percolator known to the writer.—*American Journal of Pharmacy.*

ON PODOPHYLLIN.

BY JOHN W. CADBURY.

(Presented to the Philadelphia College of Pharmacy, March, 1858.)

The rhizoma of the May-apple [*Podophyllum peltatum*], a plant growing wild, in great abundance, in all sections of the United States where a shady wood with a damp soil can be found, has for a long time been known to possess very decided medicinal virtue. The framers of the Pharmacopœia have given it a place among the officinal drugs, and have also made an extract officinal showing the esteem in which it has been held. But in the opinion of many, the podophyllum has not received that consideration which its efficient remedial power would seem to demand.

Recently, however, the attention of scientific men has been more particularly called to this drug, as the idea has been entertained that its resin might take the place of the scammony in the Compound Extract of Colocynth, and that an extract of the root could supersede the use of the Extract of Jalap in the Compound Cathartic Pill. Some advantages would accrue from such a substitution, especially in the case of the scammony; since, owing to the many adulterations to which it is subject, preparations containing it must necessarily be affected to a certain extent. The cost of the preparation would also be very materially diminished.

This subject is one of those which, at the late annual meeting of the American Pharmaceutical Association, was proposed for solution, since there is a possibility that the podophyllum alone may not be able to represent to the full extent the action on the system caused by the combination of the two drugs scammony and jalap. Previous investigations into the composition of the root of the mandrake have proved that it contains vegetable albumen, gum, gallic acid, starch, a fixed and a volatile oil, and two resins; one soluble in both alcohol and ether, the other in the former only.

Among these several constituents, the two resins alone appear to possess any purgative power, and whether to both of these, or to but one, the peculiar active principle should be ascribed, has not, as yet, been determined.

To isolate these resins, to ascertain this fact, the so-called podophyllin was treated, since it is known to contain them, associated with some colouring matter.

This podophyllin represents the root in a very concentrated form, producing the cathartic effect to a degree not to be surpassed by any other preparation which can be made from it.

To prepare it, a portion of the finely bruised root was exhausted of its bitterness by alcohol, of the specific gravity of .835: the tincture thus obtained was evaporated, by means of a water bath, to the consistence of a very thin syrup, and while hot, added to about three times its bulk of water, with constant agitation, till the whole appeared to be precipitated. By standing, this was deposited in the form of a yellowish powder, and being separated by means of a linen filter, was thoroughly washed upon it, and placed upon bibulous paper and dried, at a temperature of about 90° F.

The product as thus obtained, resembled the commercial article in all respects, except, perhaps, a slight difference in colour ; it being rendered dark, if a higher heat than that named be employed. It is freely soluble in alcohol, and partially so in ether, the latter menstruum taking up by far the greater amount, as one hundred grains yielded by treatment with it seventy-seven grains of soluble matter. A solution is effected in water, by means of a caustic alkali, from which, however, it is precipitable by the addition of an acid : even a weak one will answer the purpose.

If a very dilute solution of the alkalies be employed, it is not rendered soluble ; it appears to form a saponaceous compound with one portion, a residue remaining undissolved. Water alone, either hot or cold, did not dissolve any, nor do the dilute acids or oil of turpentine hold it in solution.

It was extremely bitter to the taste, and very permanent. In the dose of one quarter of a grain, it operated as a brisk purge, and in double that quantity, it acted as a decided cathartic, attended with nausea and some distress.

A portion of podophyllum was treated with concentrated sulphuric ether, the whole thrown on a filter and throughly washed by that menstruum—the residue presented a black resinoid appearance, and was dissolved in alcohol, and boiled with purified animal charcoal till deprived of colour ; by evaporation it was obtained, at one time, in light feathery scales, but at another, in the form of a granular powder. This is the resin of podophyllum, corresponding to the officinal resin of jalap, from which, however, it materially differs, being even less active than the article from which it was procured, as it was taken, to the amount of one grain, without producing the slightest effect. There is another point in which it is dissimilar to those resins with which it has usually been classed, namely, a solution of it in caustic potassa, in which it is freely soluble, was precipitated by an acid, the same being the case when ammonia was the solvent. It was also thrown out of solution in alcohol, on the addition of caustic potassa, but was re-dissolved by excess of alkali.

Acetic and sulphuric acids, by the aid of heat and nitric acid in the cold, also dissolved it.

It exhibited, with test paper, no colouration, although by some thought to possess acid properties.

Another portion of podophyllin was treated with a weak solution of carbonate of soda for forty-eight hours. At the end of that time it was thrown upon a filter, and water passed through, till all traces of the alkali were lost ; the residue was dried, and found to be identical with the foregoing resin, as it was insoluble in ether, and freely soluble in alcohol, and with reagents exhibited the same results. It also did not produce any effect when taken internally, in the dose of one grain.

The other resin separated from the podophyllin by means of ether, and obtained from it by spontaneous evaporation, presented a greenish resinous aspect, very brittle when dry, and seemed to possess the odour of the root without its extreme bitterness. Like the first, its solution in an alkali was precipitated by the addition of an acid, but it required heating to the boiling point to effect this solution. It was active in the dose of one quarter of a grain, producing an effect like the same amount of the podophyllin, than which it does not appear to be more powerful.

Though treated repeatedly with purified animal charcoal and boiling alcohol, it was found impossible to free it of colour.

A white principle, however, was obtained from it by treatment with boiling acetic acid, which, on cooling, deposited a yellowish powder, which, on purifying, was obtained nearly colourless ; this constituted nearly ten per cent. of the quantity operated upon, but in double the dose failed to produce any effect.

Another inert and colourless principle was also procured by the action of boiling distilled water, to which it imparted a milkiness. It was separated by agitation with ether.

It was thought that there might exist in the podophyllin a volatile principle, as it was known that exposure to the air and a high heat rendered it less active. To ascertain this point, a portion was distilled in contact with potassa, but the distillate exhibited no phenomena by which the presence of such a principle could be inferred, and internally, in a large dose, it produced no effect. The residue, after the operation, was tested by an acid, which caused a precipitate.

Various attempts were made to obtain a crystallizable principle, but unattended with any success.

From the foregoing, it may with safety be concluded that the active principle of

the May-apple root exists in a resinous substance, soluble in ether and alcohol, and present to the amount of at least seventy-five per cent. in the commercial podophyllin prepared from the said plant, and that it may be employed with advantage where the necessity either of a mild purgative remedy or of a harsher cathartic is indicated.—*American Journal of Pharmacy*, July, 1858.

ON SOME COMPOUNDS OF IODIDE AND BROMIDE OF MERCURY WITH THE ALKALOIDS.

BY THOMAS B. GROVES, F.C.S., WEYMOUTH.

I BEG leave to direct the attention of the Chemical Society to a class of compounds that I believe has not hitherto been noticed, and which I think deserves attention, as likely to afford materials whose investigation may throw additional light on that somewhat obscure but highly interesting subject, the alkaloids.

The compounds in question are, for the most part, crystalline. Their composition is represented by the empirical formula ($Hg_2 I_3$, Alk.) and ($Hg_2 Br_3$, Alk.). (Hg. =100, and Alk. representing morphine, codeine, strychnine, quinine, cinchonine, &c.)

I first observed the reaction that led to this investigation on adding to a solution of iodide of mercury in iodide of potassium a small quantity of hydrochlorate of morphine. A bulky white precipitate was formed, which, when tested, revealed the presence of mercury, iodine, and morphine, and was then found to be crystallizable from alcohol and water.

Morphine, I observed, was not the only alkaloid liable to this reaction, but that all the alkaloids proper I had access to, viz., quinine, cinchonine, codeine, veratrine, aconitine, brucine, and strychnine, also narcotine, and a similar body I have separated from the capsule of the English poppy, and termed *diacodine*, were equally so. Salicine and aloine, however, were unaffected. The iodide of potassium and mercury may therefore be regarded as a general precipitant of the alkaloids; and seeing that these compounds are nearly, if not entirely, insoluble in cold water, and have a high atomic number, I conceive they may be advantageously applied to the determination of their atomic numbers, and also may be highly useful in medico-legal investigations.

I append the individual characters of a few of the combinations containing iodine.

That of morphine is soluble to a small extent in boiling water, especially if slightly acidulated, and separates in the crystalline form on cooling. It dissolves much more readily in hot alcohol.

That of quinine is almost perfectly insoluble in boiling water, but dissolves in almost any proportion in boiling alcohol, from which the greater part again separates as a soft resinous mass on cooling. When, however, the cold solution is allowed spontaneously to evaporate, it crystallizes beautifully.

That of cinchonine behaves very similarly. Its crystalline character is, however, something different, as also its solubility.

These two last are both fusible at about 200°, and when cold are very brittle, with conchoidal fracture.

That of strychnine is insoluble to any appreciable extent either in hot or cold water, and dissolves very sparingly in boiling alcohol. From this it crystallizes in a triangular form. The crystals are quite microscopic, very brilliant, and make good polariscope objects.

That of codeine is soluble in and crystallizes from hot water and alcohol, I think more freely than any that I have observed.

That of brucine is slightly soluble in water, and generally less refractory than that of strychnine; and, like it, becomes gritty soon after precipitation.

The others I need not particularize, as they have offered no details of interest.

None of them, as far as I have observed, contain water of crystallization.

Their crystalline form is usually acicular, with, I think in most cases, a triangular section.

They are not decomposed by dilute acids, cold or hot, or by iodide of potassium, and are only affected by *boiling* solutions of the fixed alkalies.

In obtaining them for the purpose of analysis, I have precipitated one equivalent of the alkaloid by a solution of three equivalents of iodide or bromide of potassium, and one equivalent of chloride of mercury.

I have not been able to produce a corresponding ammonia compound.

Their analysis was effected :—(1.) By dissolving a carefully dried and weighed quantity in boiling alcohol, and adding thereto an excess of recently prepared sulphide of ammonium, to precipitate the mercury as HgS. The heat is kept up a few minutes, to avoid the precipitation of the compound by the cooling agency of the reagent; a slight excess of nitric acid added, and the sulphide of mercury separated and weighed in the usual manner. From the filtrate deprived of sulphuretted hydrogen by the cautious application of heat, the iodine is thrown down by nitrate of silver, and the alkaloid is estimated by difference.

(2.) By precipitating first the iodine by nitrate of silver, removing the excess of the precipitant by hydrochloric acid, and then as before.

(3.) The strychnine salt, which could not be got into convenient solution, was digested for half an hour with sulphide of ammonium, and then treated as before. When caustic potass is added after the sulphide, the sulphide of mercury is dissolved by the sulphide of potassium formed, and the liquid is immediately filled with crystals of strychnine fully one-eighth of an inch long.

In no case have I directly estimated the alkaloid. The concurrence of the analyses I doubtless owe to the ready and complete desiccation of the compounds.

The following are the results of analyses of the iodine compounds of morphine and strychnine, which appear to justify the formulæ I have ascribed to them, within the limits of error :—

Two Analyses of Morphine Salt.

	No. 1.	No. 2.
Mercury	22.85	22.63
Iodine	41.18	41.35
Morphia	35.97	36.02
	100.00	100.00

Two Analyses of Strychnine Salt.

	No. 1.	No. 2.
Mercury	23.03	22.54
Iodine	43.77	44.59
Strychnia.....	33.20	32.87
	100.00	100.00

On submitting, however, the compounds of quinine and cinchonine to the same treatment, I was annoyed to find a very considerable discrepancy, which I first thought was occasioned by defect of drying; but this having been proved not to have been the case, I considered it just possible that the compound I had analysed (the amorphous mass deposited by the cooling of its alcoholic solution) had been rendered basic by the action of the solvent; that the crystals obtained from the mother-liquor were possibly acid, and the *first* precipitate neutral.

Samples of each of these were carefully analysed, and the results obtained were identical.

Cinchonine was found to present the same difficulty, both yielding about as much of their respective alkaloids as would be expected were their equivalents one-fourth less than they are believed to be. Thus—

Two Analyses of Quinine Salt.

	No. 1.	No. 2.
Mercury	23.08	23.43
Iodine	46.52	46.69
Quinine	30.40	29.88
	100.00	100.00

Two Analyses of Cinchonine Salt.

	No. 1.	No. 2.
Mercury	23.99	23.69
Iodine	47.45	46.71
Cinchonine	28.56	29.60
	100.00	100.00

Taking these facts in connexion with the anomalies experienced by Dr. Bird Herapath in his late experiments on his interesting discoveries, the iodo-sulphates of the cinchona alkaloids (*Pharmaceutical Journal*, March, 1858), and more especially since the equivalents of Dr. Herapath's approach somewhat nearly those I have referred to, I would venture to suggest whether it would not be advisable to re-open this question by thoroughly investigating Dr. Herapath's iodo-sulphates, in connexion with the double iodides.

I will here just observe in conclusion, that the iodide of mercury and potassium was suggested by Dr. de Vry as a precipitant for strychnine; the knowledge that it is not *specially* so will prevent dangerous possibilities. I have also suggested the use of the compounds as internal remedies in cases where the simultaneous exhibition of mercury, iodine, and some alkaloid is indicated, and they are now undergoing a trial at the hands of several Weymouth practitioners.—*Quarterly Journal of the Chemical Society*, July, 1858.

ON THE EMPLOYMENT OF CARBONIC ACID AS A MEDICINAL AGENT.

BY M. FORDOS.

At the end of the last century some experiments were made by medical men in England on the effects produced by gases when used as medicinal agents. A very curious experiment of Ingen-Housz, a Dutch physician, served as the starting-point for these investigations. Ingen-Housz found that a finger, from which the cuticle was removed, and which was painful when exposed to the air, was still more so in oxygen gas, but that the pain ceased when the finger was placed in carbonic acid gas. It appears, however, that this fact had been previously known in France. Beddoes, in England, repeated the experiment of Ingen-Housz, and confirmed what the latter had stated. He directed attention to the local application of carbonic acid in the treatment of ulcerated surfaces.

In 1794, Ewart treated two cases of cancer in the breast with carbonic acid, and obtained good effects. Under the influence of this treatment the pain disappeared; one of the patients was soon cured, and in the other a sensible improvement took place. Notwithstanding these interesting results, it does not appear that the local application of carbonic acid has been submitted to further investigation since that time, probably on account of the difficulties experienced in the application and management of the gas.

In 1834, M. Mojon, a professor of Genoa, employed carbonic acid gas with success in the treatment of amenorrhœa, and the severe pains which, in dysmenorrhœa precede or accompany the menstrual discharge. He considered carbonic acid to be a powerful depressant, and an excellent antiphlogistic.

About the same time the use of carbonic acid, as furnished by mineral waters, began to be advocated. It was thus used at St. Alban, in France, in cases of rheumatism.

In 1830, Dr. Heidler organized the carbonic acid baths at Marienbad; and a little later, in 1840, the same was done at Nauheim.

In fact, for several years past, carbonic acid gas has been used at most of the baths in Germany and elsewhere. The gas is collected from its sources and conducted through tubes into chambers, where it is used in different ways. It is used in baths for rheumatism, sciatica, and certain cases of paralysis. It is also applied locally to the eyes and the ears. It appears to act as a stimulant to the skin and to the circulation.

In 1855, Simpson, of Edinburgh, recommended carbonic acid for the treatment of painful affections of the uterus and its vessels, such as uterin cancer, utero-vaginal, neuralgia, dysury, vesical irritability, &c., and he cites numerous instances of cure.

In 1856, M. Scauzoni employed injections of carbonic acid to induce artificial *accouchement*.

At the same time M. Follin, a surgeon in the Paris hospitals, made experiments with carbonic acid gas, and published an interesting paper on its use, in which he enters largely into the history of the subject.

Subsequently, Messrs. Demarquay, Maissonneure, Jobert de Lamballe, Broca, Gosselin, &c., have employed the *douche* and *injections* of carbonic acid in various affections, and have obtained excellent results.

Lastly, M. Ch. Bernard, physician to the hospitals of Paris, has published a series of observations on the good effects obtained from injections of carbonic acid in cancerous affections of the uterus.

All the experiments made with carbonic acid prove that this gas may be considered a powerful anæsthetic, which may be used with advantage in many cases; they also prove that it is possessed of medicinal properties, for the effects produced are not confined to the production of insensibility, but amelioration or cure of disease sometimes occur under the influence of this treatment.

The following simple form of apparatus has been constructed with the view of facilitating the application of carbonic acid in the form of injection or *douche*, and also for applying this gas or hydrogen mixed with the vapours of chloroform, ether, amylene, creosote, or other anæsthetic agents.

Description of Apparatus.—The flask (fig. 1 A) is of thick glass, and may have a capacity of about two pints. A tin tube (fig. 1 B, and fig. 2) is made to fit into the mouth of the flask. In the interior of this tube there are some fragments of marble occupying the lower space marked M, and above this some pieces of sponge, the object of which will be explained hereafter. The bottom of the tube is pierced with holes to allow the passage of the gas from the flask, and the top is closed with a cap (C), which screws on, or may be removed at pleasure. A short metallic tube, to which a flexible tube is attached, passes off laterally from near the cap (C), and this is used for directing the gas to the diseased parts.

Application of Carbonic Acid Gas.—When the apparatus is required to be used for the application of the gas, the tin tube is removed from the mouth of the flask, and 460 grains of tartaric acid in large crystals are introduced, so as to lie at the bottom of the vessel; over this are placed 580 grains of powdered bicarbonate of soda, and half a pint of water. The reaction and disengagement of gas will continue for about fifteen or twenty minutes without agitating the flask; afterwards agitation is to be resorted to from time to time when the action ceases. The two reacting agents being used in the solid state, the gas is disengaged gradually as these are dissolved by the water. The carbonic acid before entering the flexible tube, passes through the space occupied by the pieces of marble and the sponge, and is thus deprived of any particles of saline matter which may be mechanically suspended in it.

I have recommended the placing of the crystals of tartaric acid at the bottom of the vessel, under the bicarbonate of soda, as the carbonic acid being disengaged from the surface of the crystals, keeps the carbonate of soda in a state of agitation, and thus promotes its solution. A regular and abundant disengagement of gas is thus ensured. If the bicarbonate of soda be at the bottom of the vessel beneath the acid, the spontaneous disengagement of gas becomes suspended much sooner, and more frequent agitation of the vessel is rendered necessary.

Application of Carbonic Acid charged with the vapour of Chloroform or other Volatile Liquid.—The sponge occupying the upper part of the tin tube is intended to be used in cases such as are here contemplated.

Hardy of Dublin has employed with success the vapour of chloroform for producing local insensibility, and for applying it he has contrived a very ingenious apparatus.

The experiments of Hardy have been repeated by Dubois, Figuier, Aran, Jules Roux, &c. In Hardy's apparatus the chloroform is conveyed in a current of air, the presence of which must be objectionable. I have thought it preferable to substitute carbonic acid for air, and that the simultaneous use of two substances possessing anæsthetic properties, chloroform and carbonic acid, would produce insensibility more promptly and surely. The experiments that have been made in this way have proved highly satisfactory.

In order to charge the carbonic acid with the vapour of chloroform, a drachm or a drachm and a half of chloroform is to be poured over the sponge contained in the tin tube.

Application of Hydrogen charged with the vapour of Chloroform.—The same apparatus may be used for applying hydrogen gas charged with anæsthetic or medicinal vapours. It is only necessary, in this case, to substitute for the tartaric acid and bicarbonate of soda some pieces of zinc and dilute sulphuric acid.

NOTES ON THE PRIOR EXISTENCE OF THE CASTOR FIBER IN SCOTLAND, WITH ITS ANCIENT AND PRESENT DISTRIBUTION IN EUROPE, AND ON THE USE OF CASTOREUM.

BY DR. CHARLES WILSON.

(Read before the Medico-Chirurgical Society of Edinburgh.)

Dr. Wilson began by noticing the Castor Fiber, or Beaver, as long an animal of great interest to the physician and naturalist, and now evidently fast disappearing from the countries of Europe. He also pointed to the Castoreum, which it supplies to medicine, as a drug dignified by a celebrity of more than two thousand years, and still highly valued by many, especially continental, physicians. Notices had already been published of two proofs of the former existence of the animal in Scotland, and he was himself enabled to add a third, from a discovery made in the morass of Linton, in Roxburghshire.

The moss, it was stated, which constitutes the body of the Linton morass, is variable in depth, and covers a very extensive deposit of marl, to obtain which operations on a considerable scale were undertaken by the tenant, Mr. Purves, by whom the relic of the interesting animal, found in the course of these, was placed in Dr. W.'s hands, and to whose intelligent observation he was chiefly indebted for the particulars of its discovery. In digging about twenty yards from the margin, and after penetrating a thickness of moss of about eight feet, the marl was reached, and upon its surface was found a skull, in excellent preservation, easily recognized by Dr. W., on examining it, as that of a beaver. Either no other parts of the skeleton had remained preserved in its contiguity, or they had failed to attract the attention of the workmen; the probability being that, from the slighter texture of most of the other bones, they had been less able to resist entire disintegration, or had crumbled on exposure. The remains of deer and other animals were also discovered on the surface of the marl, at about the same distance from the margin; but, at other places, the horns and bones of deer, and among these a lower maxilla, were found fourteen feet beneath the marl itself, yet still within its layers, or at about an aggregate depth of twenty-two feet. Among the remains preserved and examined were horns of the red deer, with metatarsal bones, evidently also of animals of the deer species, all betokening individuals of once stately dimension; while the left tibia of an ox, doubtless the *Bos primigenius*, which was found imbedded at a depth of seven feet within the marl, was computed to have belonged to an animal measuring at least six feet, or, with the hoof and soft parts entire, fully half a foot more to the summit of the shoulder. The moss, at the part covering these remains, might be viewed as divided into three layers. The upper of these, approaching to about three feet in thickness, consisted of the traces of comparatively fresh vegetation: the second layer, measuring about two feet, had a less firm consistence, and changed its colour of a greenish brown, when moist and newly exposed, to almost a white when dry: the third layer extended to about four feet, but in some places to a much greater thickness, and was almost black, holding imbedded, in various grades of preservation, many and not mean remains of the primeval forests, such as trunks of trees, for the most part hazel and birch, with an intermingling of oak, some measuring from two to even four feet in diameter; and, along with these, large quantities of hazel nuts, heaped into masses, as if gathered and swept from the upper woodlands by the mountain freshets. In some places gravel was found deposited above the moss, bearing testimony to the action of similar currents.

The stratum of marl varied from two to almost eighteen feet in thickness, and consisted of the usual fresh-water shells, but mainly of *Planorbis* and *Limnæa;* the greater part being of almost microscopic dimensions, yet often in the most entire preservation. Where the relic of the beaver had been deposited, the marl, however, to judge from portions taken from within the skull, seems to have been largely, if not entirely, composed of infusoria. On the application of an acid, after a smart effervescence, with the disappearance of a considerable bulk of the material, there remained amorphous, ferruginous-like masses, and, abundantly interspersed with these, the silicious coverings of the animalcules, if they be really animal organisms. Among them Dr. W. distinguished *Epithemia Argus, sorex, turgida,* and *longicornis; Cyclotella operculata; Gomphonema constrictum; Nitzschia sigmoidea; Surirella craticula; Cymbella helvetica; Navicula lanceolata;* and, probably most abundant of all, *Himantidium arcus.* The remains of the mammals found in contact with the peat,

including the skull of the beaver itself, were of the usual dark tint acquired from that substance: those deposited in the marl preserved more nearly their natural colour. Near the margin of the loch, and about seven feet deep in the moss, were found an arrow-head and two or three iron horse-shoes; the latter of small dimensions. Could these horse-shoes, and this individual beaver, thus found at nearly the same depth in the moss, be regarded as having reached their position there coëtaneously, as, perhaps, approximatively they might, the furthest limit to which archæological experience would entitle us to go back for this would probably be the Anglo-Saxon period; but the surmise as to the era would still be a rude one, and within it, or even possibly long after it, though scarcely before, it would be necessary to allow a wide range. The skull of this specimen from Linton was exhibited to the meeting. The author then cited examples of the discovery of the relics of the beaver in various parts of England, as well as in Denmark, where it has become alike extinct, and where Professor Steenstrup has detected in the mosses the remains of its dams. Other proofs of an historical, topographical, and documentary character were adduced of its former existence in Britain, whether through the names of places, in public enactments, or in the notices of contemporary writers.

As to the rest of Europe, the history of the animal was traced from the sixth century before Christ, through a series of scanty notices in Æsop, Herodotus, Aristotle, Pliny, Strabo, Dioscorides, Oppian, and Ælian; while Horapollo, at an early period of the Christian era, had assigned it a place among the hieroglyphics of the ancient Egyptians. Among merely literary writers of the classical period, it was alluded to by Plautus, Lucretius, Cicero, Virgil, Ovid, and Juvenal. In the thirteenth century, Albertus Magnus described its peculiar constructive faculties, apparently from personal observation, in which, however, he had been anticipated by Giraldus Cambrensis in this country. It is noticed as a gregarious animal by Cuba in the fifteenth century. Among many others, and at later periods, George Agricola and Bruyerin mention it in Germany; Olaus Magnus, Pontoppidan and Linnæus in Scandinavia; Belon, Rondelet, Saumaise, and Pomet in France; and Conrod Gesner in Switzerland. Its teeth have been found in Italy; but beyond this, and a notice by Strabo, there seems no further explicit evidence of its having existed in that country, or in Spain.

Dr. Wilson proceeded to show the dissemination of the name of the beaver, apparently from an eastern root, among the Indo-Germanic races of Europe; remarking its generally near identity, though with an occasional remarkable divergence; and presenting some details as to the designations of localities and individuals to which it had given origin in different countries. Having proved that the gregarious habits and constructive instincts of the beaver were known at a time long anterior to the discovery of America, he now brought evidence that its building faculties continued to be occasionally remarkably exercised till a very recent period in Europe; or even were still exercised, though only in a few secluded localities. As to the range of the animal in our own day, he showed from Bechstein, Oken, Martius, Wagner, Brandt, Schmarda, Blasius, Fr. Cuvier, Chenu, Demidoff, and others, that it continued to be encountered, seldom or never plentifully, always in diminishing, or greatly diminished, numbers, and generally with extreme rarity, in the Austrian and Prussian States, Bavaria, Russia, Sweden, Norway, Lapland, France, and perhaps Switzerland. Among countries, on the other hand, in which proofs had been given that it was formerly indigenous, it had become wholly extinct in England and Scotland, in Italy, Spain, Denmark, and the Netherlands, and in many tracts of Germany. The economic and hygienic relations of the animal were then similarly reviewed, whether with reference to the chase and its restrictions, to its uses in diet, proofs of which were shown to have been found in the old kitchen heaps of the primitive people of the North, or to its supplying a valuable fur.

It was remarked, however, that the attention which the history of the European beaver demands from the physician, when considered with reference to its economic and hygienic uses, whether as producing an article of diet in its flesh, or of clothing in its fur, is of course widely subordinate to that which belongs to it as the source of various remedial applications, and, above all, of the for long greatly esteemed castoreum. The fable of Æsop, it had been seen, already instructs that, in the sixth century before Christ, or twenty-four hundred years ago, the beaver was recognized as an object of quest on the score of this drug. Herodotus also, not long

after, tells us that it was used by the Budini in uterine diseases. We are prepared, then, from these merely popular notices, to find that Hippocrates, the contemporary of Herodotus, introduces, though chiefly in treatises that are of questionable authenticity, the recommendation of its employment, as if of a substance already familiar, in the same class of diseases. Its appearance, subsequently, in the exclusively literary writings of several of the eminent authors of antiquity, shows that it continued extensively enough known to give scope and propriety to the use, as an illustration, of the extravagant tradition as to the circumstances of its acquisition. Pliny presents us with a detailed account of the value and extent of its uses in medicine; nor is it difficult to recognize afterwards, through all the middle ages, the special impress of the testimony of the Roman naturalist, or of the sources from which he derived it. The castoreum, according to Pliny, externally used, acted as an errhine, or, rubbed upon the head, induced sleep. Taken internally, and usually in doses of two drachms, it was beneficial in mania, in epilepsy, in amenorrhœa, and against multiform descriptions of poison. Whether used externally or internally, it was serviceable in vertigo, tetanus, tremors, spasms, nervous complaints, sciatica, dyspepsia, hiccup, and palsy. Adapted as a fumigation, it removed lethargy; as a suppository, or medicated pessary, it was beneficial in affections of the uterus; as a collyrium, it gave clearness to the eyesight; and mixed with oil, and dropped into the ear, it cured aches in that organ and in the teeth. Dioscorides recommends the castoreum as facilitating childbirth; and this appears also among its accredited virtues in many subsequent writers. It was only added, with reference to the writers of the classical period, that with Celsus it also ranked as an approved remedy; that Aretæus bestowed upon it his confidence, especially in nervous diseases; and that Galen styles it a celebrated medicine, and much in use, so that, he continues, Archigenes wrote a whole book regarding it. This weight of authority, and chiefly that of Galen, whose great genius, as well as admirable ingenuity and boldness of hypothetical statement, was so well known to have long kept the world of medicine at his feet, was as fitted to maintain for the castoreum its credit in the science of the times, as to secure its transmission to an unchallenged place in the art of the middle ages.

The paper then included some details of the uses in medicine of the various parts of the animal during the middle ages; proceeded to a more special notice of the joint observations of Mayer and Francke, published in the seventeenth century; and, finally, showed the estimation which the European castoreum, and that especially, still held as a remedy abroad, best evinced by the enormous cost at which it was purchased in various countries, and particularly in Austria. A short reference to the question of the identity or non-identity of the beavers of the Old and New Continents closed the communication.—*Edinburgh Medical Journal*, July, 1858.

ON THE EQUIVALENTS OF THE SIMPLE BODIES.

BY M. DUMAS.

(*Continued from page* 39.)

Second Question.—*Are there any simple bodies whose equivalents bear the relations in weight of* 1 : 1 or 1 : 2 ?

The answer to this question does not seem doubtful when we cast our eyes over a table of equivalents; but it is so easy to create such relations or to destroy them, by diminishing or augmenting the equivalents which present them, without exceeding the limits indicated by the ordinary uncertainty of the results of experiments, that we cannot, in reality, in most cases, form any satisfactory conclusion on this point.

To prove it I have only to communicate to the Academy the facts I have observed with reference to molybdenum and tungsten.

These two simple bodies are considered to have equivalents so nearly in the ratio of 1:2, that, until lately, the only hesitation in regard to them was as to whether they should be represented by 46 and 92, or by 47 and 94.

As it appeared to me easy to obtain molybdic and tungstic acids in considerable quantity and in a pure state, and as they are both reducible by hydrogen, I at once selected these two bodies as the basis of the verification I had in view. I did not know what difficulties awaited me, as regards tungsten, in these experiments which

have occupied me for many months, and which I have had to repeat in different forms before obviating every cause of error.

As regards molybdenum I did not experience any serious difficulty. Molybdic acid prepared by means of the native sulphide of molybdenum, submitted to combustion in a current of oxygen gas, was obtained in magnificent crystals of several centimetres in length. It was weighed in an unglazed porcelain boat. The reduction by hydrogen was commenced at a low temperature in a glass tube; in order to avoid the sublimation of the molybdic acid, it was finished in an unglazed porcelain tube, at the temperature of a good reverberatory furnace, continued until the molybdenum left in the boat had for several hours ceased to lose weight.

The equivalent of molybdenum determined by means of three distinct samples of molybdic acid was always found to be 48.

Tungsten, at first, gave me most discordant results. I prepared the tungstic acid intended for reduction by carefully calcining tungstate of ammonia ; but when I had obtained the tungstic acid of a green tint, it was in vain that I submitted it at a red heat for several hours to the action of a current of oxygen, or to that of a current of nitrous vapour ; I could not modify the colour, and the equivalent was much higher than when I operated upon tungstic acid of a golden yellow colour.

To obtain a definite tungstic acid, it is necessary to avoid exposing it to any cause of reduction during its preparation ; for, if it once undergoes a partial reduction, it cannot, without again converting it into tungstate, be brought to the state of tungstic acid.

If we wish to get it from tungstate of ammonia by calcination, it is indispensable that this salt should be in very distinct large crystals. If it is in thin silky prisms there are always in the mass, here and there, green stains which are certain indications of partial reduction, whatever care may have been taken to spread the salt in a thin layer, and however much the circumstances and the temperature at which decomposition is effected may have been varied.

With tungstate of ammonia in very distinct prisms, we obtain, on the contrary, tungstic acid of rather an orange yellow, and perfectly uniform, provided the calcination has been effected in small quantities and in thin layers in a porcelain capsule with a flat bottom, kept at the mouth of the muffle of a cupel furnace. The preparation is completed by putting the acid at the further end of the muffle and keeping it at a red heat until it has lost the last traces of ammonia.

Tungstate of ammonia may also be decomposed by means of chlorine. The precipitate of tungstic acid is washed with water charged with chlorine, at first, then with water acidulated with nitric acid ; finally, it is dried in the flask in which it was produced.

The Chemists who have tried before me to reduce tungstic acid by means of hydrogen, used platinum boats in which to place their acid. I have observed that the reduced tungsten combines with platinum and renders it crystalline, grey, and brittle. Platinum which has been subjected to this action may be reduced to powder. I have, therefore, not employed platinum.

Glazed porcelain in its turn causes the reduction of tungstic acid into oxide, which adheres to the glaze, and resists the ulterior action of the hydrogen. It was necessary to proscribe the use of porcelain boats and even of the ordinary tubes, and to have boats and tubes made of biscuit ware.

Finally, the tungstic acid, which is fixed, possesses a mobility, purely mechanical, which is much more difficult to overcome than the volatility of molybdic acid. When tungstic acid is submitted to the action of even a very slow current of hydrogen gas in a red-hot porcelain tube, it is found that the tungsten carried away by the vapour of water which is formed, colours the sides of the tube grey as far as 20 or 30 centimetres from the boat. This danger can only be avoided by commencing the reduction in a glass tube at a temperature which is very low at first but increases to a point at which the glass softens. The reduction is then finished in an unglazed porcelain tube, which, as well as the boat, should remain uncoloured. When it is otherwise, tungsten has been carried away, and the results obtained cannot be relied on.

After having successively avoided all the causes of error, I obtained 92 as the equivalent of tungsten, and this result occurred so constantly that no doubt could remain as to the accuracy of this number.

Thus molybdenum and tungsten, united by the strict analogy of all their chemical properties, and by the no less complete relations of their physical relations ; two

bodies whose densities are in the ratio of 1 : 2, whose atomic volumes are identical, which, in a word, seem intended to serve as a type for all bodies with equivalents in simple proportions, have for their equivalents 48 and 92, numbers between which no simple relation can be established.

The Chemists who have admitted a simple relation between these two bodies, have taken, as we have already said, sometimes 46 and 92, sometimes 47 and 94, as their respective equivalents ; but, as the equivalent of tungsten does not appear to exceed 92, it would be necessary for that of molybdenum to be reduced to 46, whereas it is really 48. Must it be concluded from this discussion that the simple relations, such as that which has been recognized between molybdenum and tungsten, cannot exist? I do not think so.

In fact, oxygen being represented by 8, sulphur is represented by 16.

Berzelius, it is true, always rather disposed systematically to deny the existence of such relations, considered the equivalent of sulphur to be represented by 16.10 or 16.06, according to his own experiments, and which being subsequent to those made for the rectification of the equivalents of carbon, were intended to control Dr. Prout's rule.

However, having reduced the problem to the greatest simplicity of which it is susceptible, I have probably come nearer to the truth. I have endeavoured to ascertain how much sulphur 5, 10, and 20 grammes of pure silver would require to be converted into sulphuret. I effected the conversion of the silver into sulphuret by means of a sulphur distilled three times, then dissolved and twice crystallized in sulphuret of carbon, and finally washed with a small quantity of the same sulphuret.

Twenty grammes of this sulphuret burned in a porcelain capsule left no residue appreciable by the balance.

The silver is placed in an inclined tube containing the sulphur, which, after having been fused, is directed in the form of vapour over the silver heated to redness. The silver burns in the gaseous sulphur and is converted into sulphuret. In order to get rid of the excess of sulphur, it is heated to its boiling point while a current of dry carbonic acid is made to pass through the tube. Finally, the tube is exhausted by the air-pump, and it is then weighed.

It is impossible to doubt, from the results of my experiments, that if we represent oxygen by 8, we must represent sulphur by 16. There exists, then, between these equivalents the simple relation of 1 : 2, of which organic chemistry presents so many examples, and which appears whenever we meet with two isomeric bodies, one of which is derived from the condensation into a single molecule of two molecules of the other.

Thus, there exist simple bodies, whose equivalents bear the exact relation of 1 : 2.

There also exist others, the equivalents of which are identical. Of this we have evidence in the cases of manganese and chromium, the equivalent of each of which bodies is represented by 26.

I have determined the equivalent of manganese by the conversion of artificial binoxide of manganese into protoxide, by means of hydrogen. The results obtained assign with great certainty to the equivalent of manganese the number 26.

Bodies analogous in their properties may then respectively have equivalents bearing very simple relations, such as 1 : 1 *or* 1 : 2 ; *but it may also happen that such relations do not exist, even with regard to the most analogous bodies, although the numbers representing the two equivalents seem very nearly to realize it.*

THIRD QUESTION.—*Three simple bodies being given, which belong to the same natural family, is the equivalent of the intermediate body always equal to half the sum of the equivalents of the two extreme bodies?*

So many examples appear to confirm this law, that it may be considered useless to make any investigation with a view to its verification.

Thus, 16+64, the admitted equivalents of sulphur and tellurium, give 80, the half of which, namely, 40, represents very nearly the equivalent of selenium.

20+68, the equivalents of calcium and barium, give 88, the half of which, namely, 44, represent the equivalent of strontium.

7+39, the equivalents of lithium and potassium, give 46, the half of which, namely, 23, is the equivalent of sodium.

But, besides these examples, of which the three numbers compared are sufficiently well known, how many are there, of which, out of the three equivalents grouped together, the value of one or even of two of the equivalents remains in doubt? There

is equally room, therefore, to doubt or to admit the general existence of the relations in question.

One example will suffice to show how circumspect we should be before inscribing such relations in science otherwise than according to the mnemonial process, or as an incitive to a more profound examination.

There are three bodies, chlorine, bromine, and iodine, which are connected, as every one knows, by the closest natural affinities. The physical and chemical properties of these three bodies are such, that bromine appears always intermediate between the other two, and that the history of chlorine and iodine being known, that of bromine may be deduced without error. Their equivalents are represented by 35.5, 80, and 127. For the equivalent of bromine to be the mean of those of chlorine and iodine, it would suffice to raise the equivalent of bromine from 80 to 81, or to lower the equivalent of iodine from 127 to 124.5, or to modify both to the extent of intermediate quantities, or finally, including chlorine itself among those to be corrected, to modify the three equivalents by quantities which seem to be within the limits of the possible errors of experiments.

By reducing chlorine to 35.3, and iodine to 125.7, we should have as a mean 80.5, and these numbers scarcely differ from the numbers given by experiment, namely, 35.5, 127 and 80.

I have confirmed, by a very simple method, the equivalents of bromine and iodine. For this purpose I have converted pure and finely crystallized iodine into iodide of zinc, and have used this for preparing iodide of silver. I prepared also some bromide of silver by means of a specimen of bromine quite free from iodine, after having purified it from every presumable trace of chlorine by long digestion with bromide of silver.

The bromide and iodide of silver thus obtained were converted into chlorides by the action of a current of dry chlorine. The action is rapid ; but the chloride of silver formed, was kept in a state of fusion in the chlorine for a long time after the weight of the tube containing it had ceased to vary.

Admitting for the equivalent of chlorine 35.5, as already determined (*see* page 38, No. for July) I found exactly 80 for bromine, and 127 for iodine, numbers agreeing with those which M. Marignac obtained, in his very perfect experiments.

It is, therefore, quite certain that the equivalent of bromine is not the mean of the equivalents of chlorine and iodine, although it approaches so near that the difference may appear unimportant.

If with regard to certain bodies, connected together by natural affinities, there exist triads in which the equivalent of the intermediate body is equal to the mean of the equivalents of the other two, which I still believe to be true of certain bodies, we nevertheless cannot generalize this remark. Before admitting it for any three bodies it is necessary that their respective equivalents should be determined with the utmost care, and that none of them should remain subject to the least doubt.

In fact, as the relation which is sometimes observed between the equivalents of bodies of the same family is subject to exceptions in cases where it would seem to be especially applicable, how can we venture to replace the results of experiment by numbers which have been deduced merely from this relation ?

With regard to three bodies of the same family, the weight of the equivalent of the intermediate body may therefore be equal to the mean of the weights of the equivalents of the two extreme bodies ; but the contrary may also be the case with regard to bodies most intimately united by natural affinities.

(*To be continued.*)

ON THE NATURE OF OZONE.

BY R. CLAUSIUS.*

In the January number of the *Philosophical Magazine* (p. 24), there is a communication by Schönbein, in which the discoverer of ozone describes a new property of this remarkable modification of oxygen. While, namely, ozone exerts a strong oxidizing action upon oxidizable bodies, and even upon the noble metals, nevertheless Schönbein has found that strips of paper, coloured with peroxide of lead, become

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* Translated by Dr. F. Guthrie, from Poggendorff's *Annalen* for May.

bleached when introduced in a moist condition into strongly ozonified air, owing to the reduction of the peroxide into the protoxide of lead. Such reduction Schönbein has shown in another place to be accompanied with a destruction of the ozone, that is, its conversion into ordinary oxygen.

This communication confirmed me in the view which I had previously entertained concerning the nature of ozone; and I therefore trust I may be allowed now to bring forward my view as an hypothesis.

In my paper "On the Nature of the Motion which we call Heat,"* I have endeavoured to explain the relations which exist between the volumes of simple and compound gases, by the assumption that in simple gases, as well as in compound ones, more than one atom are combined together to form a molecule; that, for instance, a molecule of oxygen consists of two atoms.† I believe now that, under peculiar circumstances, it may happen that a small portion of the great number of molecules which exist in a given quantity of oxygen, may be decomposed into two atoms, which then distribute themselves in the separate state among the remaining undecomposed molecules. *These isolated oxygen atoms, which, in their relation to foreign bodies, must naturally differ from those atoms which are combined, two and two, to molecules, are, in my opinion, ozone.*

Let us now consider, in the first place, the most important modes of formation of ozone.

If electricity passes out into oxygen or atmospheric air, or if electric sparks are discharged through either of these gases, ozone is formed; and this formation is independent of the nature of the electricity, that is, whether it be positive or negative. This action may probably be attributed simply to the repulsive power of the electricity, by virtue of which the two atoms of a molecule, being charged with the same kind of electricity, are driven apart in the same manner as is observed with larger bodies.

Oxygen, when separated from its combinations by electrolysis, under favourable circumstances, is obtained in an ozonified state. This is explained thus:—At the moment of disengagement the atoms of oxygen are separate. Most of them combine immediately upon the electrode, two and two together, to molecules; and here perhaps the electrode itself, when, for instance, it is formed of platinum, exerts an auxiliary action. A small portion of the atoms, however, remain in the separate condition, and this constitutes the ozone with which the oxygen is mixed.

Finally, a third mode of formation occurs when atmospheric air is in contact with moist phosphorus. This process may perhaps be imagined to proceed as follows:—As the phosphorus combines with the surrounding oxygen, a number of oxygen molecules, in contact with the phosphorus, must be decomposed into their two constituent atoms; and it may happen that the phosphorus does not combine with both of such atoms, but that one of them, being removed from the sphere of activity of

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* *Phil. Mag.* [4], vol. xiv., p. 108.

† Appended to an abstract of this paper in the *Annales de Chimie et de Physique*, and to a translation of it in the *Archives des Sciences Phys. et Nat.*, are some remarks by MM. Verdet and Marignac, pointing out that the idea *that even in simple gases the molecules are composed of more than one atom*, had been already advanced by Dumas, Laurent, and Gerhardt; a fact with which I was not then acquainted. Gerhardt has developed his theoretical views principally in the second half of the fourth volume of his "Organic Chemistry." These portions of his work were not yet published in the German translation by Wagner, when my paper appeared; indeed, the last sections are not published. Inasmuch, therefore, as the French original is not at my command, I have hitherto been only able to read the first part of Gerhardt's theoretical views. I have there certainly found that Gerhardt has, from totally different, purely chemical considerations, arrived at the conclusion, that free hydrogen and free chlorine should be viewed as hydride of hydrogen and chloride of chlorine (H, H and Cl, Cl). Also of oxygen it is said, that a molecule consists of several (at least two) atoms (vol. iv., p. 612). I have not yet been able to obtain the works of Dumas and Laurent, but I do not doubt that they contain similar ideas. It has been very gratifying to me to have been made acquainted with the existence of these theoretical views by the above-mentioned remarks. For although it follows that my hypothesis is not so original as I imagined, yet I can feel nothing but pleasure in seeing my ideas thus coincide with those of such excellent investigators; especially on a subject which, on the one hand, extends into so many provinces of science, that the same result may be arrived at by many different ways, and which, on the other hand, is still of so hypothetical a nature, that every confirmation of a result is desirable.

the phosphorus through the motion caused by the heat developed, remains in the separate condition. We know from electrolysis, that in the combination of *heterogeneous* atoms to a molecule, one part of the molecule is positively, and the other negatively electrical. This may perhaps also be the case in the combination of two *homogeneous* atoms, as for instance of two oxygen atoms, one of them becoming positively, and the other negatively electrical. Inasmuch, now, as, by the oxidation of the phosphorus, the oxygen doubtless enters into combination as the electro-negative constituent, it may come to pass that of the two oxygen atoms, resulting from the splitting up of a molecule, the negative one is that especially retained by the phosphorus, and the positive one may be free to move away, or at least may be less hindered from doing so. Even after such an atom, in the course of its motions, and through contact with other molecules, or the walls of the vessel, has lost its electro-positive state, thus becoming more adapted for combination with the phosphorus, yet such combination cannot take place until its motions bring it again into the sphere of action of the phosphorus.

Certain remarkable phenomena in connexion with ozonification by means of phosphorus have been observed. Thus, rarefied oxygen is more easily ozonified than denser oxygen, and oxygen mixed with hydrogen or nitrogen is more easily ozonified than when it is in the pure state. I believe that probable, or, at all events, possible explanations may be given for many of the secondary phenomena. I shall not discuss these, however, in this place.

The circumstance which was mentioned before as being probable, that, namely, in the combination of two oxygen atoms to a molecule, the two atoms have opposite electrical states, may be made use of to explain certain other phenomena. The fact that the ozone, which is formed in a quantity of oxygen, does not disappear again in a short time of its own accord through the formation of molecules by the recombination of the separated atoms, may perhaps be due to the diminished tendency which such free atoms have to combine, through the loss of their electrical condition; just as oxygen, even when ozonified, may be mixed with hydrogen without combination resulting.

When ozonified oxygen is heated, the ozone is destroyed. This may perhaps be explained by supposing that the high temperature determines the combination of the separated oxygen atoms, just as it may that of oxygen with hydrogen and other oxidizable bodies.

Becquerel and Fremy have shown experimentally that the ozonification of a given quantity of oxygen by electric sparks can only be carried to a certain extent if the ozone remain mixed with the oxygen; but if the ozone be removed as soon as formed, for instance, by the oxidation of silver, the whole of the oxygen may be gradually converted into ozone. This points to the conclusion, that if too many separate atoms be contained in the gas, they recombine with one another; and perhaps the electric sparks themselves may have the power of exerting the inverse effect under altered circumstances, that is, they may assist the combination of separated atoms in the same manner as they can determine the combination of oxygen and hydrogen.

Let us now consider some of the effects of ozone.

The principal action, namely, the strongly oxidizing power, may be considered as self-evident, after the description of ozone given; for it is clear that separated oxygen atoms can more easily enter into combination with foreign bodies than such as are already combined with one another two and two, and which must be first freed from such combination before they can be in a state fit for combination with other substances.

In this respect ozone is comparable with oxygen in the nascent state, with the exception that with the latter the electrical condition must be taken into account in addition; for when oxygen is evolved out of a compound in which it was electro-negative, it will for two reasons easily enter into another combination, in which it has also to play an electro-negative part: first, because the atoms are still in the separate state; secondly, because they already are in the proper electrical condition. Hence, oxygen in the nascent state may in many cases surpass ozone in activity.

The galvanic polarization of a plate of platinum, by immersion in ozonified oxygen, is related to the above action. It is known that the two electrodes, which serve for the galvanic electrolysis of water, become thereby polarized in such a manner as to be capable of giving rise by themselves to a current in the opposite direction. This is explained by supposing the one electrode to be covered by a layer of hydrogen,

and the other with a layer of oxygen; and such explanation accords with the fact that a plate of platinum, when immersed in hydrogen, acquires thereby also a positive polarization. But if a platinum-plate be immersed in common oxygen, the corresponding phenomenon, which might perhaps be expected, namely, the acquirement of negative polarity by the plate, does not occur; and this appears to contradict the above-given explanation. I imagine, however, that this difference may be accounted for as follows:—Inasmuch as a molecule of water consists of *two* atoms of hydrogen and *one* atom of oxygen, the atoms of hydrogen, which, like the atoms of oxygen, are also combined two and two to molecules, may enter into combination with oxygen without separating from one another. The atoms of oxygen, on the contrary, as long as they are combined together as molecules, are not in a suitable condition for combination with the hydrogen. Hence oxygen, in its ordinary state, is incapable of causing galvanic polarization, but acquires this power by ozonification.

Besides an oxidizing action, ozone may exert an opposite or deoxidizing one, as Schönbein has proved in the case of peroxide of lead, the ozone itself being converted thereby into ordinary oxygen. Now, as this transformation of ozone into oxygen occurs also when it is brought into contact with other peroxides, it immediately suggests itself that the deoxidation of the peroxide is also not confined exclusively to the peroxide of lead. This action may be explained without difficulty. If we imagine an oxide which readily gives up the whole, or a part of its oxygen, in contact with a gas in which separate oxygen-atoms are moving about, seeking to combine with second atoms, these moving atoms, on coming into contact with the oxide, are able to withdraw the atoms of oxygen which are only feebly combined. This accounts at the same time for the double effect—the reduction of the oxide and the disappearance of the ozone.

The behaviour of ozone is in many respects similar to that of the peroxides. Peroxide of hydrogen, for instance, has, as is well known, a strong oxidizing action, by reason of the facility with which it gives up its second atom of oxygen. If, on the contrary, peroxide of hydrogen be brought into contact with the oxides of the noble metals, or with certain metallic peroxides, a reciprocal reduction takes place. We may in such a case presume that the oxygen-atoms liberated from the peroxide of hydrogen combine and form molecules with those which are given off from the metallic oxides or peroxides.

In considering the above-mentioned phenomenon, the question may arise, why the atoms of ozone, or the easily separable oxygen-atoms in a single oxide or peroxide, should not unite with one another with as great a facility as the atoms of two heterogeneous substances combine together? Various secondary reasons, however, may be of influence. In the first place, the state of aggregation must be considered. In a solid metallic oxide or peroxide, the several parts are fixed in position with respect to one another; and we may therefore presume that the oxygen-atoms do not come into that contact with one another which is necessary for combination. A fluid body, on the contrary, adapts itself better upon a solid one, and its particles possess at the same time the necessary mobility. The same is the case with a gaseous body; and such a one, in addition, undergoes a condensation on the surface of the solid body. It may, moreover, be the case, that the equally electrified condition of the oxygen-atoms of a definite compound renders them less disposed to combine with one another than with the non-electric ozone, or with the oxygen-atoms of another compound, whose electrical state may possibly be a different one. Moreover, the electrical conductibility of the substance may be of influence, inasmuch as those alterations of the electrical condition which are necessary for combination, may take place more easily in contact with metallic bodies than in the interior of badly-conducting bodies. Probably still further reasons might be given in answer to the question proposed; but those already adduced may suffice, at all events, to show how numerous the influencing circumstances may be, and how vain it must be to expect to find the phenomena following some simple law which holds good in all cases.

Finally, I must remark that the density of ozone, as given by Andrews and Tait,* according to whom it would appear to be nearly four times as great as that of ordinary oxygen, is contradictory of my hypothesis concerning the nature of ozone. If,

* Proceedings of the Royal Society, vol. viii., p. 498, and *Phil. Mag.* for Feb., 1858, p. 146.

however, we reflect that the experiments could only be tried with oxygen containing comparatively little ozone, and that, in order to convert this ozone into ordinary oxygen, the whole was heated to 230° C. or more, it is easy to perceive how extremely difficult it must have been to remove the disturbing influences so far as to attain the requisite degree of accuracy. For this reason, then, without in the least calling in question the skill and care of the experimenters, I have, nevertheless, hesitated to attach sufficient weight to the results they have found, to induce me to suppress my hypothesis.—*Philosophical Magazine.*

NOTES ON FROTH.

BY DR. GLADSTONE, F.R.S.

All liquids, when shaken up with air, form bubbles; but some allow these bubbles to break and disappear the moment they are at rest, while others give rise to a more or less permanent froth. This difference among liquids appears to be of a specific character, and cannot as yet be shown to be dependent on any other quality.

As a general rule, aqueous solutions of organic bodies are most disposed to froth. Beer is a familiar instance. In this case, the formation of the froth is originally due in a great measure to the rising of carbonic acid gas through the liquid; but its permanence is totally independent of that, or indeed of any dissolved gas. This was proved by subjecting some beer to exhaustion by an air-pump till every trace of the carbonic acid and air it contained was removed, withdrawing it from the vacuum, and shaking it immediately, when a fine froth was produced which was as persistent, or nearly so, as if the beer had continued brisk.

Solutions of the acetates are peculiarly disposed to produce a permanent froth. To such an extent is this the case, that, in making use of mixtures of salts, I have sometimes distinguished those containing an acetate by this property. The acetate of iron is pre-eminent; but the acetates of copper, lead, and other metals share this property to a considerable extent. Yet acetic acid itself shows no disposition to froth; and the bubbles made when alcohol or ether are shaken instantly disappear. Acetate of iron gives off much dissolved air when it is exhausted by the pump, but it froths equally afterwards. The citrate of iron is analogous to the acetate.

This property of frothing is quite independent of specific gravity. A heavy solution of sulphindigotic acid froths, but a solution of chloride of ammonium of high density produces no persistent bubbles when shaken; while, on the other hand, a weak solution of soap, that differs little from distilled water, will produce, as every one knows, a very permanent froth.

The froth on the surface of a coloured liquid is always of a lighter tint than the liquid itself. This is what might be anticipated, when it is remembered that, in looking at froth, we see the light which has traversed only very thin films of the liquid, and hence has been subjected to but little absorption. Sometimes, however, the colour of froth is totally different from that of the liquid on which it floats: cochineal, for instance, gives a deep-red aqueous solution, which froths considerably when agitated, but the bubbles appear of a pale bluish-purple. This is due to the dichromatic character of the liquids in question; they admit many rays of the spectrum for a certain distance, which are afterwards absorbed, and that in such a way that the sum of the rays transmitted by the thin stratum conveys to the observer a different impression of colour to that which is conveyed by those rays which can penetrate a thicker stratum. Thus the thin film of cochineal solution which constitutes a bubble transmits the red ray, a yellowish-green ray, a bluish-green ray, and nearly the whole of the blue and violet of the spectrum; the resulting colour is accordingly bluish-purple mixed with much white light: a thicker stratum of the same cuts off both the green rays, and a still thicker one transmits only the red.

Of a similar nature is an appearance observed in port-wine. The new wine, when shaken, forms a bubble which is faintly red, while old port forms one that is colourless. This, indeed, is sometimes taken advantage of as an indication of the age of port. The difference arises partly from a gradual change that takes place in the colouring matter of the wine, partly also on the diminished thickness of the film that constitutes the bubble of the older and "thinner" wine. If old port be placed in a hollow glass wedge, and thus interposed between the eye and a slit in the window-shutter in such a way that the line of light is seen traversing the different thick-

nesses of the liquid, that line will appear white where the stratum is thinnest, and will become red very suddenly as the stratum increases; almost as intensely red, in fact, as when the thickness is considerable; and if this line of light be analysed by a prism, it will be seen that every ray of the spectrum traverses the thin stratum, but that suddenly they are cut off, all at very nearly the same distance, with the exception of the red ray and a portion of the orange, which are transmitted through almost any amount of the liquid.

Some bubbles, as is well known, exhibit that beautiful phenomenon designated "the colours of thin plates" or "Newton's rings." This is most strikingly displayed by the froth on the surface of the black liquid produced by adding a few drops of sulphuric acid to oil of turpentine; the play of colours is beautifully relieved against the black background.—*London, Edinburgh, and Dublin Philosophical Magazine.*

SOME REMARKS ON POISON OBTAINED FROM ARROWS.

BY HENRY J. B. HANCOCK, ESQ.

The accompanying specimens are of a novel form of what I believe to be the urari, curare, or wourali poison of Guiana, mentioned in the year 1857, by Sir R. H. Schomburgh (*Pharm. Journ.*, Trans., xvi., 500), and earlier by Mr. Waterton, in his *Wanderings* (3rd. edit., p. 84). The idea of extracting it was first suggested to me by my friend Mr. Pepper, in the summer of the year 1856; and I proceeded to extract it from some poisoned arrows brought from Guiana by Mr. Echlin, who was travelling secretary to Sir R. H. Schomburgh. I deem it curious:—

Firstly. On account of the novel form in which it appears.

Secondly. On account of the large quantities in which it was extracted from the arrows.

Thirdly. On account of its preserving to a great extent (as will afterwards appear) its properties during the many years which elapsed between the arrival of the arrows in England and my experiments.

My method of proceeding was very simple. I steeped the arrows in boiling chloroform, and then scraped them carefully in the same liquid; after evaporating off the chloroform, I obtained the poison mixed with small particles of iron from the scraping; and eventually getting rid of the iron, I obtained a quantity of crystals.

On examination I found that the crystals were nearly insoluble in water, but readily dissolved by chloroform and acetic acid. On testing, I found slight, in fact hardly perceptible traces of the presence of strychnine, but could eliminate nothing further by any test I employed.

I will now proceed to detail its action upon those animals which I have submitted to it.

Some being administered to a frog, no effect was perceptible for the first ten minutes, but after that time the animal became languid, and died in about thirteen minutes from the time of administering the poison, apparently without pain. After death there was none of that rigidity of the limbs which is to be observed after poisoning by strychnine, nor was there anything worthy of remark in the external appearance. And this I take as a proof that the amount of strychnine in the poison is very small, although there may be a slight trace, as pointed out by the tests.

The poison being introduced through an incision in the skin of the back of another frog, the same results followed, but in a shorter time, the frog dying in eight minutes after the operation.

Some of the poison being administered to a cat, the animal walked about as usual for about twenty minutes, and then became languid, repeatedly stretched itself, and at length lying down, died quite quietly, without the least appearance of pain, in about half an hour from the time of administering the poison. After death there was no more rigidity than if the cat had died from natural causes.—*Quarterly Journal of the Chemical Society*, July, 1858.

A NEW PRECIPITANT FOR THE ALKALOIDS.

BY M. SONNENSCHEIN.

Phospho-molybdic acid forms with ammonia, in acid solutions, a remarkably insoluble compound, and it comports itself in a similar manner with those compounds which are analogous to ammonia—the nitrogenized organic bases—conse-

quently forming an excellent reagent for their detection. It may be prepared in the following manner:—

Molybdate of ammonia is precipitated by phosphate of soda; the yellow precipitate, having been washed, is diffused through water, and heated with sufficient carbonate of soda to dissolve it. The solution is then evaporated to dryness, and calcined to drive off the ammonia. In case any of the molybdic acid should be reduced by this operation, the residue must be moistened with nitric acid and again calcined. The dry mass is then dissolved in cold water, the solution strongly acidulated with nitric acid, and water added until ten parts of the solution contain one of the salt. The liquid, which is of a golden yellow colour, must be preserved from ammoniacal fumes.

It precipitates the solutions of all the alkaloids, with the exception of urea, when a mere trace only is present. The precipitates are yellow, generally flocculent, insoluble in water, alcohol, ether, and the dilute mineral acids, with the exception of phosphoric acid. Nitric, acetic, and oxalic acids, concentrated and boiling, dissolve them. These compounds are decomposed by the alkalies, certain metallic oxides, and the alkaline salts, which separate the alkaloid.

To give an idea of the sensibility of this new reagent, it may be stated that the 0.000071 gramme of strychnia gives an appreciable precipitate with one cubic centimetre of the solution of phospho-molybdic acid.

ON HAUTLÉ, OR ANIMAL BREAD, OF THE MEXICANS.

BY M. GUERIN-MÉNEVILLE.

In the *Bulletin de la Société Impériale Zoologique d'Acclimation*, M. Guerin-Méneville has published a very interesting paper on a sort of bread which the Mexicans call Hautlé, and which is made of the eggs of three species of hemipterous insects belonging to the group of water-bugs.

According to M. Craveri, by whom some of the Mexican bread, and of the insects yielding it, were brought to Europe, these insects and their eggs are very common in the fresh waters of the lagunes of Mexico. The natives cultivate in the lagune of Chalco a sort of *carex* called *toulé*, on which the insects readily deposit their eggs. Numerous bundles of these plants are made, which are taken to a lagune, the *Tescuco*, where they float in great numbers in the water. The insects soon come and deposit their eggs on the plants, and in about a month the bundles are removed from the water, dried, and then beaten over a large cloth to separate the myriads of eggs with which the insects had covered them. These eggs are then cleaned and sifted, put into sacks like flour, and sold to the people for making a sort of cake or biscuit, called *hautlé*, which forms a tolerably good food, but has a fishy taste, and is slightly acid. The bundles of carex are replaced in the lake and afford a fresh supply of eggs, which process may be repeated for an indefinite number of times.

Moreover, says M. Craveri, the Mexicans collect quantities of these insects from the surface of the water by means of hooped nets, and these are dried and sold as food for birds. In Mexico these dried insects are sold in the streets and markets, the dealers crying "*Moschitos, Moschitos,*" just as in Europe they cry "*Food for your singing birds.*"

It appears that these insects have been used from an early period, for Thomas Gage, a religionist, who sailed to Mexico in 1625, says, in speaking of articles sold in the markets, that they had cakes made of a sort of scum collected from the lakes of Mexico, and that this was also sold in other towns.

Brantz Mayer, in his work on Mexico (*Mexico as it Was and as it Is*, 1844), says, "On the lake of Tescuco, I saw men occupied in collecting the eggs of flies from the surface of plants and cloths arranged in long rows as places of resort for the insects. These eggs, called *Agayacath*, formed a favourite food of the Indians long before the conquest, and when made into cakes resemble the roe of fish, having a similar taste and appearance. After the use of frogs in France, and birds'-nests in China, I think these eggs may be considered a delicacy, and I found that they are not rejected from the tables of the fashionable inhabitants of the capital."

The more recent observations of Messrs. Saussure, Sallé, Valet D'Aoust, &c., have confirmed the facts already stated, at least in the most essential particulars.

The insects which principally produce this animal farina of Mexico, are two species of the genus *Corixa* of Geoffroy, hemipterous insects of the family of water-

bugs. One of these species has been described by M. Guerin-Méneville as new, and has been named by him *Corixa fermorata*. The other, identified in 1831 by Thomas Say, as one of those sold in the market at Mexico, bears the name of *Corixa mercenaria*.

The eggs of these two species are attached in innumerable quantities to the triangular leaves of the carex forming the bundles which are deposited in the water. They are of an oval form, with a protuberance at one end and a pedicle at the other extremity, by means of which they are fixed to a small round disc, which the mother cements to the leaf.

Among these eggs, which are grouped closely together, and sometimes fixed one over another, there are found others, which are larger, of a long and cylindrical form, and which are fixed to the same leaves. These belong to another larger insect, a species of *Notonecta*, which M. Guerin-Méneville has named *Notonecta unifasciata.—Journal de Pharmacie.*

PEPSINE WINE.

In *L'Union Médicale* the following formula is given:—Take of starchy pepsine, prepared according to Corvisart and Boudault's formula, one drachm and a half; distilled water, six drachms; white wine (of Lunel), fifteen drachms; white sugar, one ounce; spirit of wine, three drachms. Mix until the sugar is quite dissolved, and filter. One tablespoonful contains about fifteen grains of pepsine, and may be given after every meal.

PHARMACY IN BELGIUM.

We have received from Mr. Joseph Ince a communication in which he expresses his regret to find that a recent paper on English and French Pharmacy has given rise to a slight misapprehension. Whatever prejudices Mr. Ince may entertain on other subjects, they do not extend to either Brussels or its inhabitants. Mr. Ince states that he has been in the habit, for some years past, of spending his vacation in the Belgian capital, and he is therefore not under the necessity of taking an experimental tour to discover facts otherwise accurately stated in Murray's *Handbook*. The remarks in the article already alluded to, were merely intended to illustrate the well-known truth that there is exhibited on the Continent a greater capability for taking life easily than is ever to be found in England. The balance is entirely in favour of our friends abroad.

ALUM IN BREAD;

ERRONEOUS ACCUSATION AGAINST A BAKER, AND ACTION FOR DAMAGES.

In the early part of last year a Scotch newspaper, *The North Briton*, following the example of the *Lancet*, commenced the publication of a series of reports on the adulteration of articles of food sold in Edinburgh. These reports were furnished by a Chemist, who was employed to analyze the substances referred to, and whose name was given as the authority for the statements made. Among the substances referred to was bread, and several respectable bakers were accused of adulterating their bread with alum and potato flour. The Scotch bakers, however, were found to be less submissive than those of London had proved themselves when similar statements were published in the *Lancet*. The truth of the report was promptly denied; the Chemist was called upon to furnish portions of the bread he had analyzed, so that the correctness of his analyses might be tested, which he refused to comply with; and an action was commenced against the proprietor of the newspaper by one of the accused parties for injuries he had sustained in consequence of such accusation. The case came on for trial on the 29th of last July, and resulted in a verdict for the plaintiff, with £30 damages against the proprietor of the paper. No attempt was made to justify the correctness of the report; in fact, it was admitted that the Chemist had been in error; that, having found minute quantities of alumina, he had concluded that the bread must have contained alum. On the other hand, it was clearly proved by the baker that he used neither alum nor potatoes in the manufacture of his bread. The result of this trial has been, that a complete retraction of the charge, and an ample apology to all the accused bakers, has been published in the newspaper which contained the report in question.

POISONING BY LAUDANUM.

On Friday morning, August 13th, an inquest was held at the Queen's Arms, Newtown, near Wigan, before Mr. Driffield, county coroner, on the body of a child named Benjamin Smith, whose death had been caused by the incautious sale and administration of poison. Elizabeth Smith, sister to the deceased, stated that on the previous Saturday her father was very ill, and she fetched for him some laudanum from Mr. Thomas Beecham's, druggist, Wallgate. However, he refused to take it, and he placed it aside, but did not recollect where. The bottle had a label upon it of a harmless medicine; but Mrs. Beecham, who served her, neither took it off nor put one on marked "Poison" or "Laudanum," nor asked her for what purpose it was required. The mother of the deceased, finding on the Tuesday afternoon that he was rather poorly, reached from the cupboard a bottle containing, as she thought, a mixture which her daughter was in the habit of giving the child when it was ill, and administered a spoonful to it. This proved to be the laudanum; and as soon as it was discovered, an emetic was given to the child, which, however, failed to remove the poison from the stomach. The coroner said that although the negligence of Mrs. Beecham was not in this instance the cause of the laudanum being administered, yet it was the duty of all druggists to label all poisons. He also made some severe remarks upon the system of giving laudanum to children, which was the cause of numerous deaths, when it was said the children died of convulsions. Verdict, "Accidental death."

POISONING BY CYANIDE OF POTASSIUM.

On Saturday an inquest was held by Mr. Baker, at the Rushton Arms, New North Road, Shoreditch, respecting the death of John James M'Cormack, who committed suicide by taking a quantity of cyanide of potassium. It appeared from the evidence that the deceased had long been in a desponding state of mind, and on the previous Thursday, his mother, who was in the adjoining room, heard him exclaim, "I've done it at last!" On going into the apartment she saw he had been taking the poison above alluded to, which is used by photographers in their business. The jury returned a verdict of "Temporary insanity."—*Observer*, July 25th.

POISONING BY ACONITE.

On Wednesday evening an inquiry took place at the Bank of England Tavern, Paddington, before Mr. Wakley, coroner, respecting the death of Mr. James Edward Dubiggen, aged fifty-eight, who committed suicide by taking aconite, a narcotic poison, under circumstances of a very extraordinary and melancholy nature. Mr. Arthur Lawrence, house-surgeon of St. Mary's Hospital, said he found the deceased in a state of collapse. He was evidently suffering from the effects of a narcotic. Everything was done that the nature of the case required, but, notwithstanding, he rapidly sank and died. On a *post mortem* examination it was ascertained that death resulted from aconite, a poisonous root, very much resembling horse-radish. He (Mr. Lawrence) had arrived at the knowledge that the unfortunate deceased had chewed the root in question, and that to such an extent as speedily to terminate his existence. Verdict, "Insanity."—*Observer*, July 25th.

ACCIDENTAL POISONING BY MORPHIA.

An inquest was held on Saturday, Aug. 14th, before Dr. Birt Davies, Borough Coroner, at the Swan with Two Necks, Great Brook Street, Birmingham, on the ody of a little girl named Mary Cromwell, two years of age, residing with her parents in Lawley Street, who met with her death under the following circumstances. Her father has been for some time past under treatment by Mr. Rann, surgeon, for a bad cough, and has been taking medicine containing morphia. On the previous Wednesday a fresh bottle of the medicine was sent to Mr. Cromwell, and it was placed as usual on the table, close to the wall. Being left down stairs for a short time in company with a sister two years older, the poor child uncorked the phial and tasted some of its contents, and finding the taste agreeable she swallowed the whole of it, the proportion of morphine to the quantity taken being about a grain and a half. She soon afterwards fell into a state of stupor and insensibility; and although Mr. Rann, who was sent for when it was discovered that the bottle was empty, administered every antidote, she expired in the course of the same evening. The jury returned a verdict of "Accidental death."

SUICIDES BY PRUSSIC ACID AND LAUDANUM.

Wednesday afternoon, August 18th, Mr. Wakley, the coroner, and a jury held an inquest at Hampstead on the bodies of Mr. William Ashcombe, a surgeon, of 5, King Street, Cheapside, and of Mr. Edward Prior, a hosier at 13, Finsbury Place North. The deceased were in no way connected, but there was this coincidence between them, that, being wholly unacquainted, they had gone to this suburban village and put an end to their existence within a few hours of each other, the one on the heath, after the manner of the late John Sadlier, and the other at the house of a friend.

The circumstances, as related in evidence, first with respect to Mr. Ashcombe, were that the deceased was about 43 years of age, unmarried, and a surgeon practising at 5, King Street, Cheapside. On Tuesday evening, about half-past 7, he called, as was his habit, on Mr. Frederick Mountford, a wine merchant, residing at Woodbine-cottage, in the Vale of Health, Hampstead, with whom he had been on terms of intimacy for several years. After some conversation of an ordinary friendly character between them, the deceased asked what time the last omnibus to town left. On Mr. Mountford telling him at half-past 9, he inquired what they were going to have to drink in the mean time. Mr. Mountford produced a bottle of pale brandy and some cold water, of which they drank. This over, Mr. Mountford offered to accompany him to the omnibus, and had got as far as his front gate leading on to the road, when, perceiving that Mr. Ashcombe was not following, he returned into the house to inquire the cause, and found him sitting in an easy-chair, retching and speechless. The nearest surgeon was sent for, but he died in a few minutes, and before medical aid could be procured. On the person of the deceased a bottle was afterwards found which had contained strong prussic acid, together with nearly 30*s.* in money, and near to where he sat was a small packet of morphine, unopened. Dr. Brown, of Hampstead, who made a *post mortem* examination of the body, proved that death was unquestionably caused by a dose of prussic acid. The deceased was cheerful while in Mr. Mountford's, but told him in the course of their interview that he apprehended there would be an execution in his house before he got home. On a policeman going to his house in King Street to apprise the inmates of the death, he found the sheriff's officer in possession for a debt of £31, and the apprehension of this circumstance had, no doubt, been preying on the mind of the unfortunate gentleman. According to his friend Mr. Mountford, he was in the habit of taking small quantities of hydrocyanic acid, mixed with magnesia. This, which he called his 'dose,' was compounded of 10 grains of the latter ingredient and five drops of the former.

The jury found that the deceased poisoned himself, but that there was no evidence to show in what state of mind he was at the time.

The inquest on the body of Mr. Prior disclosed that he was 40 years of age, unmarried, a hosier in Finsbury, and the son of very respectable parents, residing at 22, Manchester Terrace, Liverpool Road, Islington. He was found in a dying and insensible state by Frederick Standen, a police-constable, about 2 o'clock on Monday morning, on a seat under some fir-trees on Hampstead Heath, and conveyed to the workhouse, where he died the same morning, about half-past six, without having spoken. He was attended by Drs. Brown and Winter, and a *post mortem* examination by the latter revealed that his death was attributable to narcotic poison. There was evidence that on Sunday afternoon the deceased, who was of temperate habits, applied at the shop of Mr. Allen, a chemist in the Liverpool Road, for an ounce of laudanum for toothache, but the assistant in the shop would only supply him with eight drops, and these he largely diluted with tincture of myrrh. The bottle containing this mixture was afterwards found on the deceased's person nearly full, and the inference is that he had purchased the poison elsewhere. Letters addressed to his parents, and accompanying his will, were found upon him, taking leave of them in affectionate terms, but showing that the unfortunate man's mind had undergone some sudden derangement. The jury found that he died of poison, administered by his own hand, while in an unsound state of mind.

SHEEP POISONED.

On Wednesday, the Belford carrier was the bearer of serious news to Alnwick, to the effect that Mr. Black, of Burton, near to Bambro', had lost, up to the previous evening, 500 out of a flock of sheep—their death being almost immediately consequent on their being "dipped." A subsequent communication from the carrier says that "650 sheep have died up to this time." They were dipped on Saturday morning, and afterwards sent to grass, and as it came on a very rainy night, it is supposed than the liquid had been quite washed from the wool, and the sheep having ate the grass, had been poisoned. This is the most likely cause of death that we know of at present. Latest account is, 750 dead.—*Northern Daily Express*, August 20th, 1858.

BOOKS RECEIVED.

L'Officine, ou Repertoire Général de Pharmacie Pratique. Par Dorvault. Cinquième Edition. Paris: Labé, Libraire de la Faculté de Médecine. 1858. pp. 1095.

Health and Disease: *their Laws, with Plain Practical Prescriptions for the People.* By Benjamin Ridge, M.D., F.R.C.S., &c. &c. London: Chapman and Hall, 193, Piccadilly. 1858. 8vo, pp. 624.

The Ophthalmoscope; *its mode of Application explained, and its value shown in the Exploration of Internal Diseases affecting the Eye.* By Jabez Hogg. London: John Churchill, New Burlington Street. 1858.

The instrument consists of a small circular mirror of about ten inches focus, made for the ordinary microscope, having a hole bored in the centre, and mounted in a piece of tortoiseshell. In using it, the rays from the flame of a lamp, reflected by the concave mirror, are made to fall in a state of convergence on a convex lens, in front of the eye under examination, while the observer's eye is looking through the small central aperture of the concave mirror, which is held in the hand.

TO CORRESPONDENTS.

J. G. G. (Whitechapel).—*Iodized Collodion:*—

Rectified Ether .750 .....3 fluid ounces
Alcohol of .836.....2 fluid drachms
Pyroxiline. .....8 to 14 grains

Dissolve the Pyroxiline, and let the fluid stand for forty-eight hours to subside, then draw off clear, with a siphon.

To each fluid ounce of this plain collodion add about two fluid drachms of the following iodizing mixture:—

Alcohol, sp. gr. .836 .....1 fluid ounce
Iodide of Potassium .. ...16 grains.—*Hardwich.*

Chemicus (Southampton).—The powders alluded to are composed of Bicarbonate of Soda and Tartaric Acid, ʒvi. and ℈ij. of the former, and ʒvss. of the latter.

A. B. C. (Horncastle).—Hooper's *Medical Dictionary.*

J. R. C. (Norwich).—Apply by letter to the Secretary of the Linnean Society, Burlington House.

A Subscriber (Penrith).—(1 and 2.) The subject is not within our province.—(3.) See any elementary work on Chemistry.

C. S. (Evesham).—Babington's *Manual of British Botany* (Van Voorst), 10*s.* 6*d.*, or Hooker and Arnott's *British Flora* (Longmans), 14*s.*

An Inquirer (London).—*White Liniment.* If the ingredients are mixed carefully and in the order in which they are prescribed, no separation will take place.

F. J. W. (Bishop's Stortford).—See page 154.

A Correspondent (Birmingham).—The Handbill has been received.

Chemicus (Frome).—Christison or Taylor on Poisons.

An Assistant (Bedale).—Beasley's *Druggist's Receipt Book.*

J. T. (Hereford).—The communication has been received.

T. M. (Gloucester).—*Decoctum Aloes Compositum.*—Vol. vi., page 221.

Registered Apprentice (Brandon).—Riddle's *Latin and English Dictionary*, 21*s.* Littleton's Dictionary is out of print.

C. L. M. (Hull).—The cells should be water tight, and the plates soldered, not riveted, together.

W. A. (Dumfries).—(1.) Balfour's *Manual of Botany.* (2.) *Cyme*, a form of inflorescence resembling an umbel or a corymb, but with a centrifugal expansion, indicated by the presence of a solitary flower in the axis of the dichotomous ramifications.

J. F. P. (Putney).—The label alluded to is liable to stamp duty.

A Druggist (Liverpool).—Apply by letter to the Secretary.

C. J. (Oxford Street) is thanked for his communication.

Mr. Sturton (Cambridge) wishes to correct an error in the report of what he said at the Meeting, July 12th, respecting the sale of laudanum. Mr. Sturton states:—"I did not say the party obtained the Laudanum elsewhere, and applied it to the destruction of his life, but merely that knowing there had been a family quarrel, I refused to sell it."

Instructions from Members and Associates, respecting the transmission of the Journal, to the Secretary, Elias Bremridge, 17, Bloomsbury, Square, W.C.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington Street. Other communications to the Editor, 15, Langham Place.

THE PHARMACEUTICAL JOURNAL.

VOL. XVIII.—No. IV.—OCTOBER 1st, 1858.

THE NORTH BRITISH BRANCH OF THE PHARMACEUTICAL SOCIETY.

The Pharmaceutical Society is not yet fully established in Scotland. Some of the leading Chemists of Edinburgh joined it at or near the commencement, and have been steadfast in their endeavours to extend its influence, and commend it to the favourable notice of their neighbours; but it was difficult to overcome the prevailing impression that it was a London Society, and could confer but little benefit on Members at a distance. Consequently it made slow progress in the North, and for several years it was doubtful whether any success would attend the endeavour to establish an effective branch in Scotland.

In the first draft of a Pharmacy Bill which was prepared for consideration it was, therefore, proposed to confine its operation to England; but this having caused some dissatisfaction, the subject was reconsidered, the scheme was enlarged so as to comprise Great Britain, and in the Act as ultimately passed, a section was introduced providing for the appointment of a separate Board of Examiners for Scotland, to sit in Edinburgh, Glasgow, or elsewhere, as the Council might decide. This provision imposed a definite responsibility on the North British Branch of the Society, and soon after the passing of the Act a general invitation was issued to Chemists and Druggists both in England and Scotland, inviting all who had not already joined the Society, and who could obtain the requisite certificates of qualification, to avail themselves of a bye-law passed for that purpose, enabling the Council, during the limited period of about six months, to admit, on production of certificates of qualification, Chemists who had been in business on their own account prior to a certain date. Meetings were held in Edinburgh, Glasgow, and Aberdeen; and several smaller towns were visited by Members individually, with a view of making generally known the objects of the Society, and pointing out the advantages of uniting for mutual benefit and scientific improvement. A considerable number of names were added to the list of Members in Edinburgh, which was, and continues to be, the centre of the operations of the North British Branch. Some accession of Members was obtained in Glasgow, but the number was small, which may be partly attributed to the circumstance that in that city many of the Chemists and Druggists are licentiates of the Faculty of Physicians and Surgeons of Glasgow, and, in fact, qualfied to act as Medical Practitioners. This union of medical practice with pharmacy tends to destroy the identity of each class, and the *esprit de corps* which might otherwise have existed among the Members of the Pharmaceutical body is to some extent lost in consequence of the amphibious nature of the qualification. In Aberdeen a Society of Chemists and Druggists had previously existed for some years, and it became a question whether, in the event of joining the Pharmaceutical Society, the Members should be taxed with a double subscription, or whether the old Society should merge into the new one. Some difficulty arose in reference to the latter arrangement, and nearly all the Chemists of any standing in Aberdeen joined the Pharmaceutical Society. Perth and a few other places are also represented in the Society; but the total number of Members in Scotland, the population of which rather exceeds that of London, is less than a fifth of the number of the London Members.

The meeting of Chemists and Druggists in Dundee (reported in another part of this number) affords a favourable indication of increasing interest in the progress of Pharmacy. Although the historical part of Mr. Mackay's paper is an epitome of circumstances with which some of our readers are familiar, we have complied with the desire expressed at the meeting, by publishing it entire, because it is addressed especially to Scotland, and furnishes, in a concise form, information which the Chemists in that locality do not generally possess respecting the proceedings and practical utility of the Society. It was stated by several who were present at the meeting, as well as by others with whom we have been in communication, that they had not previously been aware of the importance of the institution, having hitherto supposed it to be merely a scientific society, established chiefly for the benefit of the London Members, by means of lectures and meetings, which could not be available for Members at a distance. Very little appears to have been known on the subject in many localities, and consequently there was not enough interest felt in its proceedings to induce inquiry on the part of those who, when the merits of the case were duly explained, regretted that they had not been made acquainted with the circumstances at a time when admission could be obtained with greater facility than at present. The influence of the Society in raising the professional status of its Members, regulating the education of Apprentices and Assistants, and watching over the general interests of the trade, had not been previously understood; and upon being explained and demonstrated, the result is in most cases a desire to join the Society. There is every reason to believe that if the bye-laws at the present time empowered the Council to admit Members on the terms and conditions specified in the bye-law of 1853, a large proportion of the Chemists of Scotland would avail themselves of the opportunity. It is not to be expected that Chemists who have been many years in business will submit to be examined either in London or Edinburgh; and as admission without examination was only a temporary indulgence, necessary at the commencement of the Society, but having already exceeded its prescribed limits, it is difficult to contrive any mode by which the door could be once more opened to the parties to whom we refer, without sacrificing a general principle to the personal interest of individuals. The only question which occurs to us as affording a possible solution of the difficulty, is, whether it might not be provided in a new Act of Parliament that some indulgence should be granted to Chemists not being Members of the Society who were in business prior to a certain date. Sooner or later the Pharmaceutical Society must comprise and represent all the *bonâ fide* Chemists and Druggists in the kingdom, and in the attainment of this object some concession must be made to those who have for a considerable time had a vested interest in the business, although they have only recently become convinced of the policy of joining the Society. It has been suggested that this object might be attained by another bye-law, duly confirmed by the Secretary of State, and having operation, like the bye-law of 1853, for a limited time. It is, however, undesirable to be continually reopening this question, and making fresh exceptions to a general rule, which ought at the earliest possible period to be strictly enforced. If the subject should ever be revived, it should be by a *final* arrangement, precluding the possibility of a renewal; and this could only be effected by Act of Parliament. If a bye-law were passed as proposed, giving the Council power to admit, during a limited period, as Members, Chemists having a certain standing in the business, the effect would only be partial. Some would avail themselves of the privilege, but others would come forward after the expiration of the limit, and complain that they had never heard of the bye-law or of the Society until it was too late; and then the same arguments which are now urged in favour of renewing such power of admission, would be urged again. Experience has shown that this would be the case; for in 1853 many thousands of circulars were issued, explaining the operation of

the new bye-law, the objects of the Society, and the terms and conditions of admission. Yet we are now told by many Chemists in various localities that they never heard of it.

If an Act of Parliament were passed extending the influence of the Society by giving the Members a status which would have the effect of inducing all future Chemists and Druggists to qualify themselves and obtain admission, such change in the relative position of Members and those not Members would furnish a just ground for a provision to meet the cases of Chemists in business prior to the date of the Act. This would be a final settlement of the question, after which the law would take its course, any imperfection in its efficacy would be cured by the lapse of time, justice would be done to all parties, and the beneficial influence on the qualifications of the Pharmaceutical body would, year after year, become more manifest, as was the case with the Apothecaries after the passing of the Apothecaries Act of 1815, with only this difference, that the parties affected by the change in the present instance will continue to be Pharmaceutical Chemists instead of becoming Medical Practitioners.

We know by experience that the passing of an Act of Parliament is a task not easy of accomplishment, and that a delay of months or years may possibly take place before any progress is made; yet when we consider how forcibly the public attention was directed to the subject of Pharmaceutical education in the course of the recent discussions on the Sale of Poisons Bill, we think the Legislature will be prepared to take up the subject, and that the difficulty attending it will not be so great as it has hitherto been. We therefore look forward to a favourable amendment of the laws at no distant period. In the mean time the influence of the Society is increasing, and, by perseverance in the performance of its duties, will continue to increase. This influence is not confined to the Members and Associates, but the importance of education is becoming more generally appreciated. In Aberdeen, as well as Edinburgh and Glasgow, and wherever the means of instruction are within reach, it is a common practice to allow Apprentices to attend a course or two of Lectures, and they enter upon their occupation with a full knowledge of the fact that, unless they keep pace with the times by qualifying themselves for the duties they will be called upon to perform, they will enjoy but a small prospect of success in their business. We have found this to be the case in several instances where the employers are not Members of the Society, having omitted to join at the proper time, but being now sensible of the advantage of membership, they use their influence with their Apprentices to induce them to pass through the prescribed course of education, and qualify themselves as future Members.

The Board of Examiners of the North British Branch of the Society will meet in Edinburgh on the 13th of October, on which occasion we hope the number of candidates will be such as to confirm the favourable reports which we have received.

TRANSACTIONS

OF

THE PHARMACEUTICAL SOCIETY.

MEETING OF THE COUNCIL, 1*st September*, 1858.

Present—Messrs. Bird, Brew, Bucklee, Davenport, Meggeson, Morson, Peacock, Standring, and Waugh.

The following were elected

MEMBERS.

BURY ST. EDMUNDS.....Scott George
LONDON.....Mousell, Thomas
MANCHESTER.....Woolley, George Stephen
NEWCASTLE-ON-TYNE.....Dobson, John

EXAMINATION IN SCOTLAND.

A MEETING for Examination will be held in the Society's Rooms, No. 51, George Street, on Wednesday, 13th October.

Parties desirous of coming before the Board, with the view of joining the Society as Members, Associates, or Pupils, are requested to communicate with the Secretary, 121, George Street, at least ten days before the day of meeting.

Edinburgh, August, 1858. JOHN MACKAY, *Secretary*.

NORTH BRITISH BRANCH.

MEETING OF CHEMISTS AND DRUGGISTS AT DUNDEE.

IN accordance with a requisition forwarded to the Edinburgh Board of the Pharmaceutical Society, a meeting of the Chemists and Druggists of the North-Eastern district of Scotland was held in the British Hotel, Dundee, on Wednesday, Sept. 15th, "to take into consideration the means best suited to forward the interests of the trade, to secure a more united action with the view of raising the status of the profession, and also to direct the attention of masters to the more efficient education of the young members." At four o'clock upwards of thirty gentlemen sat down to dinner, among whom were:—Messrs. Russell, Jobson, Hardie, Parker, Mackay, and Mudie, Dundee; Mr. Smith, St. Andrews; Messrs. Robertson, Mackay, Flockhart, M'Farlan, Raimes, Gardner, Sang and Finlayson, Edinburgh; Messrs. Dandie and Reid Perth; Messrs. Reid and Burrell, Montrose; Messrs. Lawrence, Shield, Bruce, M'Leish and Barrie, Arbroath; Messrs. Hodgston and Blackhall, Brechin; Messrs. Law and Rankin, Forfar. James Robertson, Esq., Chairman of the North British Branch of the Pharmaceutical Society, occupied the chair; and the croupier's chair was filled by William Smith, Esq., St. Andrews.

After the cloth was removed, the usual loyal and patriotic toasts were given, that of the "Army and Navy" being responded to by Mr. Raimes of Edinburgh.

Mr. FLOCKHART, of Edinburgh, proposed "The Council of the Pharmaceutical Society in London."

Mr. M'FARLAN, of Edinburgh, in acknowledging the toast, assured the meeting that the members of the London Board resident in the metropolis had rendered great service, not only to the Society and to the profession, but to the general public, by their active exertions in opposing recent legislative measures of an injurious tendency, such as the Sale of Poisons Bill, which contained several very obnoxious provisions, and which was thrown aside in the House of Commons, after having passed the Lords, on account of the opposition raised against it by the Pharmaceutical Society in London.

The CROUPIER proposed "Prosperity to the town and trade of Dundee," which was acknowledged by Mr. Russell.

Mr. Jobson proposed "The health and prosperity of friends from a distance," which was acknowledged by Mr. Burrell, of Montrose, who referred to the importance of union and organization among the members of their profession, if they were really desirous of raising their status and elevating the standard of education for young members.

Among the remaining toasts were—"The health of the Chairman," by Mr. Russell; "The health of the Croupier," by Mr. John Mackay; and "The health of Mr. Mackay," by Mr. Jobson.

At half-past six tea and coffee were served, after which a conference was held on the more especial object of the meeting—Mr. Robertson presiding.

The business of the conference began by a brief statement from the Chairman on the advantages to the profession which had resulted from the operation of the Pharmaceutical Society in making them better known to each other, in uniting them in one great organization for their common good, and especially in gradually raising the standard of education amongst them, and thus improving the general status of the profession. He assured the meeting that the members of the Edinburgh Board of the Pharmaceutical Society had cheerfully responded to the invitation forwarded to them by their friends in this district, and they would be glad if the result of this conference would be to increase the membership of the Society, and to increase the interest taken in its proceedings by the members.

Mr. John Mackay, of Edinburgh, then read the following paper on

THE PAST AND PRESENT STATE OF PHARMACY;

With a Special Reference to the Origin and Progress of the Pharmaceutical Society.

Having been requested to address this meeting on the past and present state of Pharmacy, with a special reference to the origin of the Pharmaceutical Society, I must ask your indulgence for the very inadequate manner in which I fear I will be able to lay before you the rise, progress, and position of the Society, several of whose Members I see around me. I have, however, undertaken the task, even in the face of those in every respect more able having declined it, from an earnest hope that some good may arise to our profession generally from the present conference; for I feel certain that, if well supported, the Society of which I am about to speak is capable of doing much to raise Pharmacy to a high place among the sciences of the present day.

It is not a difficult thing to wander back in the history of our own country to a period of thirty years, and glance at the state in which this department of science, in connexion with the drug trade, lay shrouded. If there existed life at all, it required the aid of microscopic power to discover it; and although here and there, amid the dark and misty horizon, there appeared a bright and luminous star, rendered, it may be, all the more remarkable from the surrounding gloom, yet the fact is undeniable, that where there might have been knowledge, greatness, and power, there was generally little else than ignorance, dulness, and worse than Egyptian darkness. We cannot stop to inquire *why* such a sad state of things had so long existed, nor can we say how it was that Chemists and Druggists should for such a length of time have quietly submitted to such a shameful condition, but certain it is that a more perfectly barren and uncultivated waste never existed than what ought to have been the rich and productive field of Pharmaceutical science, in so far as it pertained to the ordinary Druggist in Great Britain. It is really sad to think of the want of knowledge displayed within the last quarter of a century by many connected with the drug trade; and I am only stating what has come under my own observation, when I say that young men have applied for situations as assistants, who could not tell the chemical composition of Epsom salts, or the constitution of water, and to whom the atomic theory was a mere name without any reality, while again the construction of the galvanic arrangement was a perfect mystery, and of whom you might as well inquire the meaning of ancient Hebrew characters, as ask an explanation of the terms negative and positive, in their relations to electricity. I hope that I may not be blamed as too severe in making these remarks, which, however, are not more startling than true; for certainly such cases as those named not only did exist, but, glaring as they are, might be supplemented to a great extent. Though comparisons are said to be neither pleasant nor agreeable, yet I think they sometimes answer a good purpose, by holding up a

mirror in which we may now and again observe deficiencies and mark improvements ; and, therefore, with this feeling, in order that you may see our comparative Pharmaceutical degradation at the time previously referred to, I crave your especial attention to the following experience of Professor Christison on the other side of the Channel :—

Professor Christison repaired to Paris about thirty-four years ago, to study practically the higher branches of chemistry. His adviser there, the late eminent physiologist, Dr. Edwards, recommended, to his surprise and amazement, that he should place himself under the tuition of a Chemist and Druggist. The Professor's surprise, however, ceased, when he found he was to have for his teacher under the designation above given, the late amiable, inventive, scientific Robiquet. M. R.'s dwelling communicated with his boutique or shop, where he superintended an extensive dispensing establishment, and with his laboratoire, or Chemist's laboratory, he, in immediate contact with the ordinary routine of trade, carried on with unwearied enthusiasm those scientific researches by which the name of Robiquet will ever be distinguished amongst the most successful cultivators of chemical science, and, as if to make the nothingness of Pharmaceutists in this country at that time complete, the Professor further states it required little acquaintance with French chemistry to perceive that this distinguished Chemist was the type of a class in France numerously representing the higher walks of the profession of Pharmacy, men to whom the world has since assigned the most elevated rank as chemical discoverers in a field equally rich in scientific and practical results. Some of these Pharmaciens or dispensing Chemists of Paris attained to the rank of Members of the French Institute, the rarest and highest of all purely scientific honours in Europe.

If we leave France and enter the German states, we find the same honourable position held by the Pharmaciens, and, as is well known, some of the most eminent of the Chemists there have been engaged as Pharmaceutists.

As evidence of the correctness of this statement, I may mention that the great Baron Liebig commenced his career as a Pharmaceutist. The following were also Pharmaceutists :—Trommsdorff, Varentrapp, Fresenius, and Will. These appertain more especially to Germany, while in France we may add to Robiquet, M. Dumas, the late Minister of Commerce and Agriculture in Paris, and who began life with an Apothecary at Geneva, and continued as a Chemist and Druggist until he gradually rose to the above high position; Baron Thenard, of the University of Paris, who also began as a Pharmaceutist, and was a pupil of Vauquelin, another name high in the chemical world. We will only add other two names to the list, viz., Pelletier and Persoz, both of whom were Pharmaceutists. The list might be much extended, but this will be unnecessary, as enough has been said to show how much more eminent as a class the Pharmaceutists abroad have been, and still are, when compared with those in this country.

Cross the Atlantic, and we find there that Pharmacy is more a profession than in Great Britain ; and in illustration of this very subject, I was introduced within the last two months to a gentleman from Philadelphia, who on giving me his card, and which bore his name with the simple designation Pharmaceutist, told me that at home he had a dispensing establishment very similar to my own, but that he had a class of forty young men pupils to whom he delivered lectures on materia medica and botany. This he has done for several years, and on his return again to America, will continue to give his courses of lectures as the seasons come round.

I think you will now agree with me that twenty years ago there was very great need indeed for some decided and firm steps to be taken with the view to rescue this country, if it were possible, from such a disgraceful state as it was evidently in when compared with the position Pharmacy held in other countries.

So far back as 1830, repeated attempts were made to unite and organize the Chemists and Druggists in England to form a separate, distinct, and independent body of themselves, but every endeavour so made proved useless. In this state matters remained until the beginning of 1841, when a Medical Bill, so well known as Mr. Hawes's Bill, was introduced and attempted to be passed into law. This Bill, containing much that was objectionable, was accordingly opposed by the Chemists and Druggists; and some of the leading Chemists in London, having had their attention specially directed to the sad state in which Druggists were placed, considered the present a good time to make another attempt to organize a separate and distinct body among the Chemists and Druggists, and, with an anxious desire to consider what

would be the best means to raise and elevate Pharmaceutists in this country to a position more becoming and consistent, these gentlemen met together in the early part of May, 1841; and from this preliminary meeting arose the Pharmaceutical Society. The first official meeting of the Society took place in the month of June of that year, by which time it may be considered to have sprung into existence. A committee of Chemists and Druggists having conducted matters from the time its formation was first mooted up to the formation of the Society itself, those gentlemen were requested to remain and act as the first Council. And now that the ship was fairly launched, and a good crew found determined to do the best they could, it became a necessity that tried men and true should be found to act as efficient officers. Accordingly, the first President was Mr. William Allen; Vice-President, Mr. Payne; Treasurer, Mr. Pigeon ; and Secretaries, Messrs. Farmar and Smith. It may not be without interest to know, that during the first year the Members numbered 663, and the Associates 260; 23 Honorary Members were also appointed, and these were resident thus—1 in Aberdeen, 1 in Berlin, 1 Edinburgh, 1 Geneva, 1 Giessen, 13 London, 1 Manchester, 2 Paris, and 2 America. That the selection was judicious no one will doubt when such names as the following were found in the list:—Christison, Liebig, Brande, Daniell, Graham, Lindley, Paris, Pereira, Ure, Dalton, Pelouze, &c.

I cannot, however, pass over the formation of this Society without an especial reference to the eminent individual who, at the advanced age of seventy, became our first President, and who continued to hold this office with so much benefit to the Society up to the time of his death. This excellent and good man, William Allen, in whom was centred the benevolence and philanthropy of a Howard, the talent and ability of a Humphrey Davy, and the energy and untiring zeal of an Isaac Newton, was the son of a Spitalfields silk manufacturer. At the early age of fourteen he was to be seen busily employed constructing a telescope from card board and glass. He had not money wherewith to purchase an instrument, but, with a determination which never deserted him in after life, he continued his work; and when night had canopied the restless city and stilled its noonday roar into a murmur, and when the countless planets are keeping watch over the houses of men, you will see he has succeeded; for behold him at his open window, the pasteboard tube pointed heavenward, his young and eager eye, as sleepless as the objects to which its gaze is so earnestly directed, seems fixed to the other extremity; when, springing from the window with an exclamation of delight and ecstasy, he cries—"I see them, I see them! the moons of Jupiter are visible!" Such a boy was William Allen; but in spite of this early love for astronomy, even at this time his room, small as it was, gave ample evidence of strong chemical propensities and desires ; and acting contrary to the wish of his father, whose very anxious desire was to bind him amidst the silken meshes of his own occupation, he escaped, and a Chemist of no ordinary standing he became. Neither time nor space will permit that I should dwell much longer on the extraordinary career of this wonderful man, but while he was still young, although at this time a partner in the business of a Dispensing Chemist in Plough Court, we also find him taking the lead in the formation of a philosophical society; delivering repeated lectures upon scientific subjects both at Guy's Hospital and the Royal Institution, to the extent of 108 in one year, all of which were highly applauded. Associated also with some of the leading men of the age, we find him with Sir Astley Cooper inhaling, by way of experiment, gaseous mixtures until his face becomes purple and his eye fixed; or again, shut up with Sir H. Davy experimenting in electricity, or closeted with Dr. Jenner considering a paper on the cow-pox. But while thus fully engaged in scientific and professional pursuits, he never forgot what was due to his fellow-man, and thus we find him establishing soup kitchens, savings banks, unceasing efforts along with Wilberforce for the abolition of the slave trade, establishment of the British and Foreign School Society, and the editorship of a well-known periodical called the *Philanthropist.* Genuine all-pervading piety, indomitable energy, unbounded benevolence, and kindness of heart constituted the main features of his character; while his godly, consistent, and virtuous life gave undoubted evidence that a great philosopher was quite compatible with a sincere Christian. His travels, his acts of goodness, his interviews with earth's greatest monarchs, his visits to prisons, schools, and public institutions, would, I believe, fill a volume; but I cannot further pursue this subject. However, I believe I have said enough to show that we may be deservedly proud of our first President; and when I add the fact that he took the trouble personally to sign all

the diplomas of the Members who joined the Society during the time he was President, amounting to 1600, less value will not be attached to that signature by those who have now listened for the first time to the few remarks I have made regarding William Allen's early history.

The Society having been now fairly started, it may be proper to mention the real objects contemplated by its founders, and these may be comprised in the statement that the very foundation of the institution consisted in a desire to form the Chemists and Druggists of Great Britain into one ostensible, independent, and educated body, and for the protection of the general interests of the profession, and the special advancement of the art and science of Pharmacy.

It has been said that while in Arabia and China more attention was paid in early times to medicines and their compounds than in any other part of the world, yet it is alleged that the most ancient druggist's shop ever known was that of Galen in Rome, who lived about the beginning of the Christian era. From his time onwards for several hundred years little appears to have been done to advance medical science, and rank empiricism was the order of the day, and ran riot for many years. At length the whole civilized world was taken by surprise and shaken to its very centre by the promulgation of alchemy, that most extraordinary, exciting, and bewitching study, which so engrossed the time and emptied the coffers of so many excellent men. Many of these alchemists were clever, painstaking, laborious, and intelligent, and although the will-o'-the-wisp they so closely and untiringly pursued ever and anon eluded their eager grasp, it can neither be denied nor doubted that their thirst for the discovery of the philosopher's stone and the elixir of life was the means of bringing to light many of the hidden wonders of chemistry, and actually paved the way for numerous remarkable and useful discoveries. Going forward a step, we find that the original Chemist and Druggist, or more properly vendor of drugs, arose as a class from the servants of Physicians, who being employed by their masters to compound medicines for their patients, and even employed to perform some of the minor operations in surgery, considered themselves well entitled to enter business, and became known as Apothecaries. This took place as far back as the thirteenth century, and for about three hundred years groceries, spices, and drugs were sold by these primitive Apothecaries; but in the early part of the seventeenth century some of those men separated themselves and became a distinct associated body, leaving groceries, spices, &c. &c., to be sold by others. Steps were, however, taken by their enemies (Physicians and others) to make sundry complaints against them to government, but the king supported the Apothecaries, and they became from this time a most important body, and, emboldened by their success, commenced to attend patients, prescribe, and compound. As a natural consequence, Pharmacy became neglected, because whenever the Apothecary entered the lists as a medical practitioner, he of necessity ceased to have any inclination to prosecute the study of Pharmaceutical Chemistry, but left the field to be occupied by the legitimate Chemist and Druggist, who now made his appearance; and well may it cause more than surprise to think that for nearly a century and a half we should have remained so disunited and disorganized. To attempt a remedy for this state of affairs the Pharmaceutical Society was commenced, and as a proof that the minds of many were alive to this important step, it may be mentioned that in the second year of the Society's existence the Members numbered 982, and the Associates 976—Members, first year, being 663, and Associates 260; which number, when compared with those formerly given, tells much in favour of the Chemist and Druggist. The subscription at this time was £2 2*s.* annually from Members, and £1 1*s.* from Associates, while Life Members were required to pay £21. The original purpose of the founders was to form an efficient school of pharmacy, found a laboratory, establish lectures, hold stated meetings for scientific discussion, and for the purpose of bringing before the Members and Associates subjects of general use and importance connected with their daily avocations. Last, and certainly not least, among the contemplated arrangements, was the formation of the Benevolent Fund, from which decayed or unfortunate Members, upon certain conditions, might receive pecuniary assistance; a most desirable thing, considering how uncertain are riches and continued success in the affairs of life. All these contemplated arrangements have been thoroughly and completely carried out. A most important point to be gained was the possession of a suitable building in which to commence vigorously the requisite operations, and this difficulty was overcome by obtaining the premises No. 17, Bloomsbury Square, and in which house the

Society is still located. The first meeting was held in the new house of the Society in January, 1842, and immediately thereafter a staff of lecturers rallied round the institution, some of whom continue to this day, others have been removed by death. The following names at once afforded a guarantee as to the efficiency of this department, viz., the late lamented and highly gifted Dr. Pereira, Theophilus Redwood, Thomson, and Fownes—Bentley on Botany. The foundations of a laboratory, museum, and library were also laid, the superstructure on each of which will bear comparison with anything of the kind in this or any other country. The museum especially forms one of the finest, most comprehensive, and interesting to be seen anywhere.

The limits of this paper forbid that I should any longer dwell upon the formation of the Society, and therefore I will carry you on to the most important era in the history of the Society, viz., to the time when a Charter of Incorporation was obtained. In April, 1843, or within two years of its establishment, the Pharmaceutical Society received a Royal Charter. By getting such a deed as this the Society was placed upon a better footing than it had ever been before. All Members were now recognized as Chemists and Druggists, and admission could only in future be given to such as possessed certain qualifications, while the diploma became a legal and recognized instrument, and any person not a Member, using a similar production, would be liable to an injunction, and be sued by the Society. About four months after the commencement of the Society application was made to the College of Physicians in London for advice and assistance, but the reply sent back was that the College must have further time to consider how this could be best effected with due attention to the privileges conferred by charter upon other bodies. This reply shows the importance attached to a charter. It was a source of complaint that the Society did not apply sooner for this Charter, but it would have been very unwise to have made application for this document until some practical evidence had been given of our respectability, capability of conducting ourselves properly, and in other words our fitness to receive such a distinction ; and, therefore, you will agree with me in thinking that when awarded to the Society at such an early date it betokened much zeal and unremitting exertion on the part of the Council and Members to find the petition accepted and the honour bestowed. The application to her Majesty was based upon the simple statement that the Society was established for the purpose of advancing Chemistry and Pharmacy, as well as promoting a uniform system of education for those who should practise the same, and also for the protection of those who carried on the business of Chemist and Druggist—and so a chartered body the Society became.

It may be well to mention here, that at the close of 1844 the funded property belonging to the Society amounted to above £8000, while books and apparatus were valued at £2000 more. This included the Journal, given away gratis to Members and Associates, as well as the complete machinery, in full operation, for conducting the affairs of the Association. It was therefore submitted to the Council by several Members, that the annual subscriptions should be reduced to one-half; and thus those who were already Members should only pay £1 1*s.* per annum, and Associates in the same position, 10*s.* 6*d.* ; while Life Membership should likewise be reduced to £10 10*s.* This change began in 1845, and has continued ever since in reference to early Members, and those who joined the Society up to the passing of the Pharmacy Bill.

As examinations had always formed a part of the machinery of the institution, so the framing of a legislative act was never lost sight of by some of the leading Members. Doubtless all feel that the ulterior object of the Society was to get such a power as, under Government, would make the education of the future Pharmaceutist compulsory. In 1845, therefore, the subject was mooted, but nothing definite done until the summer of 1846, when the Council proposed to found a College of Pharmacy, protected by Act of Parliament. But though a rough draft of such a Bill was submitted, no further step was taken until April, 1847, when a rough copy of what would have been the first Bill was read to a special meeting of Members, and was called "A Bill for regulating the Qualifications of Chemists and Druggists." In furtherance of this object, a deputation of the Society had an interview with Sir George Grey, regarding the deficient state of Pharmaceutical education, which the Secretary of State at once admitted, and promised that he would further consider the matter. Nothing further was done. The Council of the

Society were not idle, however. Almost every year some medical or surgical Bill made its appearance, all the clauses of which required to be watched ; and year after year, up till 1851, brought a series of duties, which fully occupied the time and attention of the office-bearers of the Society. We must not forget the extremely troublesome times politically of the years just named ; for with the Corn Laws and other particular business, it seemed impossible to enlist any Members on our side, and create with them such an interest in our case as would have induced them to make the attempt to get for our Society a Parliamentary Bill.

And now, before proceeding to speak regarding the Bill which we did ultimately obtain, I cannot refrain from noticing the continued and unremitting labours of Mr. Jacob Bell on behalf of the Pharmaceutical Society. Certainly to this gentleman we are all individually and collectively deeply indebted. His late father, John Bell, for more than half a century stood foremost in the list of dispensing Chemists in the west-end of London, and I confess I value highly the privilege and honour of having stood side by side with Mr. Bell at the same counter during part of 1836-37 and 38. I can therefore speak with freedom and sincerity of Mr. Jacob Bell as of one possessing no ordinary talent and ability. Fortunately for the present and future race of Pharmaceutists, he entered the lists most anxiously, fearlessly, and energetically, as the champion of increased knowledge and extended education as applied to the study of Pharmacy by the Chemist and Druggist. His efforts began early in 1841, since which time, the amount of labour he has bestowed, and the sacrifices he has made in forming and carrying on the Society whose claims I am now advocating, words would fail to express. Among his first acts in connexion with the Society, was the publication of the Pharmaceutical Transactions in the form of a monthly Journal. This he commenced as a mere experiment, and when its success was certain, he handed it over to the Society, but continued to be, as he still is, the editor. Those of us who have been in the habit of receiving this publication regularly know its value, and I may state that not very long since I heard one of our greatest living Chemists declare, that had the formation of this Society done nothing more than been the means of establishing this Journal, from the able way in which it had been conducted, the scientific public owed the Society a vote of thanks and a debt of gratitude. Undoubtedly but for Mr. Bell the Pharmacy Act would never have passed, and any one who knows the history of that Bill must have some idea of the nights and days of anxious toil which had to be endured until the Bill became law. Sorry, indeed, am I to think that bad health alone prevents Mr. Bell being present with us this evening—a result certainly induced from his unceasing and untiring efforts to surmount difficulties and hinderances which obstruct the path of our progressive improvement.

Mr. Bell having become a Member of the House of Commons in 1851, brought in the Pharmacy Bill in August of that year. As the session of Parliament was coming near a close, the onward movement of the Bill was delayed until the following year, when a select Committee was appointed to consider the Bill, examine witnesses, and report to the House. On the 17th day of March the Bill was therefore committed, with full powers to send for papers, persons, and records, to the following gentlemen:—Messrs. Bell, Ewart, Bouverie, Sir W. Gibson Craig, Cardwell, Sir H. Willoughby, Wakley, Deedes, Hindley, Jackson, Farrer, Wyld, Branston, and Lord Burghley. The Committee sat for twelve days, and throughout Mr. Bell acted as Chairman.

During this time there were thirty-one witnesses examined, and with the following result:—Dr. Arthur Wilson, Mr. South, Mr. Savory, Sir Benjamin Brodie, Mr. Squire, Mr. Herring, Mr. G. W. Smith, Dr. Hofmann, Mr. Baschet, Dr. Hamberg, Mr. Giles, Professor Kopp, Dr. Douglas Maclagan, Dr. Marshall Hall, Dr. Pereira, Dr. Stilwell, and myself, gave evidence in favour of the Bill ; while opposition was given by Mr. Upton, Dr. John Gardiner, Dr. Combe, Dr. Watson, Dr. Robert Renton, Dr. A. Wood, Dr. Webster, Dr. Crisp, Dr. Cormack, Dr. Ancell, Mr. Propert, Mr. O'Connor, and Dr. Lewis. Now it would at any time afford most interesting and instructive matter to analyze the voluminous evidence which at this time was given, and from a portion of which I regret to say very serious amendments and alterations of the Bill were prepared and carried. This, however, can scarcely be wondered at, when our two Colleges in Edinburgh, and the Society of Physicians and Surgeons in Glasgow, gave by deputy their decided opposition unless some con-

siderable alterations were made in some of the clauses. It was very curious to find that the great fear entertained by our opponents was, that by becoming an over-educated body, we would interfere with and trench upon their department by counter prescribing ; and yet our great aim has ever been to draw the line most strongly between excessive counter practice and pure Pharmacy, and I think common sense alone would tell that where a man is educated as a Pharmaceutical Chemist there is not only less chance but less danger in such a party interfering with medical practice; for experience bears me out in the statement that ignorance goes hand in hand with quackery and danger in the case of Chemists and Druggists. One witness, and a high authority too, declared that he thought Chemists in this country were educated quite sufficiently, and that there was no further call for increased education among them as a body: and yet listen to the following query and reply:—The question was put by Mr. Bouverie to Dr. Arthur Wilson in reference to ignorant persons compounding prescriptions, and the doctor having replied that he and every Physician must feel humiliated at the chance of the prescription finding its way to some of the present Chemists, was asked, "Is that in respect of the quality of the medicines, or in respect of the competency of the persons who make up the prescriptions to measure out the quantities of medicine and compound them together properly?" Answer—"With respect to both points, I may be allowed to say that in the course of my censorial official inspection of the medicines in the City of London, I have come upon such incidents as these: I and my colleagues have found in a shop in the City a widow woman, with a baby in her arms, dispensing medicines, her husband having died two or three months back, and the woman depending for her sustenance, and that of her child, upon a little miserable shop. Again, with respect to one material of which we all know something, under the name of cathartic extract, which is known to the chairman and myself as extract of colocynth, it appears from notes which I made at the time that I found in every shop but one in the course of one of my visits, that extract very hard and very black. In the only shop in which there was an exception to this hardness and blackness it was very soft and very mouldy. That is a combination which is in daily and hourly use by prescription." In reply to the next question, whether the extract had the characteristic odour, the reply was, it was pronounced bad in every way, so hard that it could not be made into pills, and *very bad.*

Time will not, however, permit that I should go into the evidence further, although, as already stated, there is ample material for a very interesting paper, from the evidence given before the Committee of investigation. At the conclusion of the labour of the Committee, the following Report was given in to the House of Commons by Mr. Bell, as Chairman:—

"That they had considered the said Bill, had taken evidence thereon, and had gone through the Bill, and made amendments thereunto."

See then our Pharmacy Bill in a poor mutilated condition, and shorn truly of its fair proportions, and yet destined to become the law of the land, which it immediately thereafter became, and under the operation of which we have ever since carried on proceedings. One or two very peculiar features in the Pharmacy Bill require to be here specially noticed. The one, that instead of the concentration of all examining power to London, there was an extension of the Board to Edinburgh —or, in other words, while it had been hitherto the practice and imperative rule for all who required to enter the Society by examination to proceed to London for this purpose, a Board of Examiners, with full powers, was established in Edinburgh, before whom candidates in Scotland are required to appear. Again, while the door remained open for certain Chemists, under proper certification, who had been in business prior to 1843, there became no way now in which any person could be admitted, whatever their position and status, without examination. The fees were also completely remodelled. For registration as a Pharmaceutical Chemist under the Government Registrar the payment was fixed in one sum at £10 10*s.*, while admission as a Member of the Society cost £5 5*s.* more, and no annual payment whatever. But, with the view of future Pharmaceutical Chemists being drawn from the junior branches of the profession, it has been arranged that a pupil or apprentice may at any time during his apprenticeship, on giving the Board in London or Edinburgh satisfactory evidence of his classical education, be admitted to the Society on a payment of £2 2*s.* Upon again coming before the Board to

undergo the minor examination, he pays, if found qualified, a further sum of £3 3*s*., and assumes the name and standing of an Associate. Moving onwards, the same party comes forward and offers himself for the major examination, when, if qualified, he pays £5 5*s*. more, and then becomes a Pharmaceutical Chemist; and upon entering business on his own account, he, by a further payment of £5 5*s*. (and of course without any further examination), becomes a Member of the Society, receives his diploma, and remains a Life Member, continuing to receive his Journal gratis. I may just further name the kind of examinations under the three heads, Classical, Minor, and Major. The first consists in obtaining evidence by *viva voce* examination, or if the candidate resides at more than ten miles distance from London or Edinburgh, by certificate from a clergyman or schoolmaster, of the lad's proficiency and acquaintance with the ordinary rudiments of the Latin language and the simple rules of arithmetic. It is expected that the pupilage of Apprentices will expire with the indenture, or at all events not exceed the time when he becomes twenty-one. The second consists in requesting the party to read and translate Latin prescriptions, giving the full termination of the words, with a literal interpretation of the directions. Then follows an examination in Materia Medica, and he is expected not only to recognize the samples placed before him, but also to name their nature, properties, and doses. An acquaintance with metals, earths, alkalies, acids, salts, and other substances used in medicine, is expected. In Botany, a general knowledge of the distinctive characters of the medicinal plants must be possessed by the candidate. Questions in Chemistry, connected with various pharmaceutical preparations in the Pharmacopœia, are put, and likewise some of the tests for the detection of powerful poisons. The Major Examination may be stated to be an extension of the above. This will give an idea to those unacquainted with the system pursued since the passing of the Act. Of course the examinations are becoming gradually more stringent, because the Council in London and in Edinburgh think the advantages for study at the present time are so great, when compared with those enjoyed in bygone days, that juniors should now be well up in the various subjects enumerated. I may state that it has been the custom with myself and others in Edinburgh to have a special clause in each indenture, binding the parents or guardians to pay the fees, the master agreeing to give the time for a course of Materia Medica and one of Chemistry. Of course this cannot be managed in every town in the country, but some system of study should be closely pursued where no regular class can be attended.

From what has been stated you will have an idea as to the reasons which gave rise to the Pharmaceutical Society. During the seventeen years of its existence it has never stood still, and although repeatedly assailed both from without and within, it has boldly and steadily pursued its way, progressive improvement being its watchword and banner. I might shortly enumerate its onward course, by observing that the Society has—

1. Established a system of self-government.
2. It has raised the status and respectability of the Pharmaceutist.
3. It has constantly advocated increased education.
4. It has again and again stood boldly forward, fought the battle, and successfully resisted attempted encroachments.
5. By its voice and actions it has shown an anxious desire to protect the public from accident in connexion with Pharmacy.
6. It has proved that proper qualification in the dispensing Chemist is the most likely and certain means of putting aside all quackery and deception.
7. It has also drawn the attention of Government, as well as the Colleges of Physicians and Surgeons, to the fact, that the Pharmaceutists of this country are both able and willing to be of service, as is instanced in the Sale of Poisons Bill, which they were the sole means of shelving; while the application from the College of Physicians regarding the new national Pharmacopœia, is proof, if any were wanting, of the improved position of the Pharmaceutical Society.

I could go on for pages detailing the good produced in various ways from the operations of the Society, but fear I have already trespassed too long on both your time and patience, although I cannot refrain from alluding to what I know is the feeling of many of our Members, that the Council have not done enough, and that

ere this time grocers and other unqualified parties should have been prevented selling drugs. Doubtless this is one of the many improvements which from the very first the Society has never lost sight of, but the difficulties in the way of doing this are so great that, if dispassionately viewed, those who are foremost in the cry will be the first to be convinced that no British House of Commons will at once crush or do away with vested interests—although I doubt not when the day comes, and come it will, when Government will make it compulsory on all future dispensing Chemists and vendors of medicines to pass an examination, and hold the diploma of our Society, then, and not till then, may we look for the sweeping measure which will place the Pharmaceutical Chemist in his proper position, and enable him to rank somewhat nearer his continental brethren in point of professional standing and position. Look for a moment at the requirements of a Pharmacien in France. A young man intending to become a dispensing Chemist there must first take the degree of bachelor of letters, then study materia medica for one year, chemistry and botany a second year, and toxicology, with chemical and pharmaceutical manipulations, a third year, after which he has to pass a regular examination before he dare open his shop. Again, in Sweden the Apprentice must be fifteen years of age, and must have gone through a course of geography, modern languages, and Latin. At the end of the third or fourth year he undergoes his first examination in botany, chemistry, pharmacy, and in German and Latin. He then passes a further examination as an Assistant, and when he wishes to open shop he is required to repair to Stockholm to pass an examination performed by two professors of the Royal Caroline Institution. Even in the Mauritius a similar system is followed, and why ought we to be so far behind these several places in our education as Pharmaceutical Chemists? Not that I admire the government of these foreign countries, although I have no objection that in all professional matters we may glean the good and leave the bad. Nor would I wish to be misunderstood in contrasting the comparative condition of Pharmacy in this country and other continental places. No one can more admire than I do the high honour, integrity, honesty, and elevated commercial spirit which have so long animated the British nation, a spirit of which we may all justly be proud, placing her as it has done first in the list of nations. Her greatness none can call in question or deny; but commercial enterprise is one thing, and scientific investigation and attainment another.

Thirty-one years ago, the year in which Canning died, it was desirable that he should have some really good quinine, and at that time the best in the world was to be got in Paris, and an urgent message was sent there to an English dealer to procure some and forward it with as little delay as possible, and on going to the French Institute, the party found three of the best Pharmaceutical Chemists of the day, from one of whom he obtained the quinine and sent it off to England direct. Or hear the following, as a melancholy episode (related by Dr. Christison) in the history of British Chemical Pharmacy, that while France and Germany had been teeming for years with a multitude of imperishable discoveries in vegetable and animal analysis, it was not till 1831 that the detection of an energetic neutral crystalline body in elaterium, at the same time by Dr. Hennel, of London, and Dr. Monies, of Edinburgh, contributed the first active proximate principle of British discovery to the immense pre-existing list of continental origin.

I feel that I need scarcely prolong these remarks, and my sincere hope is, that one and all now hearing me will put their shoulders to the wheel, and by a united and vigorous effort do something towards perfecting our present very imperfect system of education for the Pharmaceutical profession. No efforts of ours can ever effect any good unless we make increased qualification and scientific knowledge our groundwork. No man ought to be selfish in anything, far less in such an important matter as this, and though many of the Members of the Society now living may not be spared to see the Pharmaceutist of Great Britain all he could wish, yet if he only assist during his day and generation in pushing forward the good work, he will have a satisfaction within himself, a greater reward than any this world can bestow, of having been instrumental in raising what has been more or less his daily employment from a mere trade to a profession, and that profession taking a stand in a high position, linked hand in hand as sister to medicine and surgery.

Some have objected to the Society for two especial reasons, viz., because the standard of education is too high, and the fee for examination is too much. With

all deference, I think the first objection erroneous, and I do not consider it any breach of confidence to state, that the Edinburgh Board of Examiners have all along, and still are, ever ready to consider any particular case, and they do not, and never have looked for the same proficiency in any one who has been many years in business, that they would expect in a young man who has had the advantage of recently attending classes, &c.; while with regard to the latter, it must be remembered how much the founders have paid since the formation of this Society. An anecdote is told of an ancient philosopher, who was once asked by a rich man how much gold it would take to educate his son, and on being told the sum, replied it was enormous, and far too large—nay, it would absolutely purchase a slave; to which the sage replied, "Keep it, then, and buy one; you will then have two." Now, I would urge all who are really interested in the progress of Pharmacy, to consider whether the sum of £15 15*s.* would not be well invested by joining our ranks, or whether, by keeping back this sum, he is not doing both himself and the cause much injustice.

In bringing these remarks to a close, permit me to lay before you, as a contrast, the position of the Society in point of numbers and means in Dec., 1857, as compared with what it was in the first and second years of its formation. The Members for 1857 numbered 2172; the Associates, 272; the Apprentices, 223; in all, 2667; funded property, £8670; value of museum, library, laboratory, &c., say £5000; Benevolent Fund, £5036. The demand for additional space is so great that the leases of two contiguous houses have been purchased by the Society in Bloomsbury Square, and already such alterations are going on as will, it is supposed, render the museum second to none in the world in point of extent, interest, and importance.

A cordial vote of thanks was given to Mr. Mackay for his interesting and instructive paper.

Mr. M'Farlan, of Edinburgh, narrated the successful steps taken by the Pharmaceutical Society to throw out the Sale of Poisons Bill in the last session of Parliament. He urged the importance of organization among Chemists and Druggists if they would really elevate their profession; and pointed to the success of the medical profession in obtaining the reappointment of Dr. Henderson, of Fordoun, as an instance of the power derived from union and organization among the members of the medical profession.

Mr. Smith, St. Andrews, advocated the establishment of a district Association in connexion with the Pharmaceutical Society, and noticed many subjects connected with the profession which might be discussed with profit to all parties by such an Association—such as the best means of promoting the studies of the younger members of the profession, the shortening of the hours of business, the prices of medicines, and topics of a similar nature.

After some conversation on the propriety of adopting the suggestion of Mr. Smith as to the formation of a district Association in connexion with the Pharmaceutical Society, from which it appeared that there was a unanimous desire for the establishment of such an Association, the following Committee was appointed to make the necessary arrangements for organizing the Society, viz.:—Messrs. Russell, Jobson, and Hardie, Dundee; Mr. Smith, St. Andrews; Mr. Burrell, Montrose; Mr. Shield, Arbroath; Mr. Dandie, Perth; Mr. Hodgston, Brechin; and Mr. Law, Forfar—Mr. Russell, Dundee, Secretary and Convener.

ORIGINAL AND EXTRACTED ARTICLES.

AMBROSE GODFREY HANCKWITZ.

Date 1660—1740.

BY MR. JOSEPH INCE.

(*Concluded from page* 162.)

Light after shadows—on February 5, 1729, Godfrey was elected a Fellow of the Royal Society, exactly one week in advance of his fellow-worker and companion, Sigismund August Frobenius. Rarely have there been two friends more one in object and more dissimilar in character. Godfrey loved facts, and described them in plain homely phrases; while Frobenius loved Rhetoric, and adopted a style of composition, which his friends called ornate, and his enemies inflated. Dr. Thomas Thomson, in his history of the Royal Society, has the following entry in his chronicle of events:—"Frobenius, in an absurd, pompous paper, describes the properties of Sulphuric Ether, the combustion of Phosphorus, and the properties of its acid." Notwithstanding, for a short time Godfrey and Frobenius must appear together, as they seem alternately to have begun and finished each other's work, and certainly were mutually bent on the same special line of discovery. In November 18, 1731, Frobenius made several experiments before the Royal Society on Phosphorus Urinæ, some of which, as related by Godfrey's eldest son, will tend to illustrate the singular chemistry of that date:—

"He took a Solution of Phosphorus in his Ætherial Spirit of Wine, which he called Liquor Luminosus, and poured it into a tub of warm water, whereupon it gave a blue flame and smoke, attended with so small a degree of heat as not to burn the hand if put into it.

"He poured some of his Ætherial Spirit of Wine upon a tub of cold water, and set it on fire with the point of his sword (which being first heated a little, he touched with it a piece of Phosphorus, lodged beforehand on the side of the tub). After the Deflagration, the water was cold. He then showed a very extraordinary process with Phosphorus glacialis Urinæ, or stick Phosphorus of Mr. Ambrose Godfrey. He had a very pompous machine, which he calls Machina Frobeniana pro resolutione Combustilium (inventa anno 1730). It is really an improvement of the common Bell, under which the Oleum Sulphuris per Campanam is commonly prepared."

The narrative ends with an enumeration of several elaborate experiments, which are more curious than scientific. Godfrey, in his turn, addressed the Royal Society, and endeavoured further to elucidate the subject. His remarks are entitled, "An Account of some Experiments upon the Phosphorus Urinæ, which may serve as an explanation to those shewn to the Royal Society by Dr. Frobenius, on Nov. 18, 1731, together with several Observations, tending to explain the nature of that wonderful production, by Ambrose Godfrey Hanckewitz, Chemist, F.R.S." Enough has been already said upon this point, and fortunately a far more important discovery than that of Phosphorus brought Godfrey and Frobenius a second time together. This was the production and manufacture of Sulphuric Ether, a remedial agent which has held its ground in public estimation up to the present time.

The early history of Ether is the more remarkable, as its preparation originated a generous rivalry between Boyle, Sir Isaac Newton, and our two philosophers, whilst the dawn of a new discovery is attended with an interest which no subsequent improvement of modern dexterity can supersede.

The first notice of Ether occurs in the Philosophical Transactions, March, 1730, vol. xxxvi., page 288, "An Account of a Spiritus Vini Æthereus, together with several Experiments tried therewith, by Dr. Frobenius, F.R.S." Having fully recorded his investigations, the writer proceeds to state: "Thus far Dr.

Frobenius, but to make this paper more than a mere harangue, it is absolutely necessary to subjoin two paragraphs out of a paper of that excellent Chymist Mr. Godfrey (Dr. Frobenius's fellow labourer) in these experiments which he delivered in when this Æther was made public before us, Feb. 19, 1729—30. 'That this Liquor Æthereus was formerly very much esteemed and inquired into doth clearly appear by an experiment I made formerly for my worthy master, Esquire Boyle, by the means of a metallic solution, namely, by the solution of crude Mercury united with the Phlogiston Vini or other vegetables, and this Æther swam on top of the solution, which I separated per Tritorium. Note.—This is what I have done formerly in Esquire Boyle's Laboratory, and Sir Isaac Newton was very well acquainted with it too; which by reason of shortness of life was not brought to a full end, to do it so readily in quantity. But when Dr. Frobenius, by experiments on this in my laboratory, did produce it in greater quantity, he wanted to see how far Sir Isaac Newton had gone on with it in his book. There we saw that great man's application in Fol. 330, that he had done it cum Ol. Vitr. et Sp. Vini. This of Sir Isaac Newton is the Vini Æthereus, only there is a difference in the process. The Liquor Æthereus is made with equal parts in measure not weight. The upper yellow liquor is separated from the inardent sulphureous per Tritorium. The inferior liquor is thrown away, and the superior yellow is put into a retort to be distilled with the most gentle heat; and the extraction of the ætherial liquid continued so far until the superior Hemisphere feels cold, and the retort being clapped in the hand, there is found in the receiver a Vino-sulphureous gas, very ætherial. Let the Sulphur be precipitated by adding an Alkali, and gently throwing it in till all ebullition ceases, and the liquor will not farther strike itself against the hand, but will strangely attract it. Then the Alkali will go to the bottom of itself, or precipitate itself in the common water.'

"*Postscript.*

"I have purposely omitted giving the receipt entire, which Mr. Godfrey has done in the next paragraph; as also Dr. Frobenius in his paper, because those who would read this Transaction may refer to the learned author for it.

"And as for others who may chance to cast their eyes upon this paper, they will know where to have enough of it, by reading Mr. Godfrey's last paragraph."

Caution is undoubtedly useful in its place, but may possibly be carried to an extreme. The detailed account of the process of Frobenius, as well as the résumé of his experiments, is contained in the Philosophical Transactions, vol. xli., page 864, date 1740. The passage relating to Frobenius is as follows:—"Take of Oil of Vitriol, and the highest rectified Spirit of Wine equal parts by weight, not by measure: pour the Oil of Vitriol little by little into the Spirit of Wine, because they will grow hot upon mixing; shake them often that they may mix thoroughly; digest gently in a glass retort, a large receiver being applied and luted on, lest the subtile spirits should fly away. Then distil them in an Athanor, in gentle digestion, for three days, and pour back the distilled liquor, till the liquor in the recipient appears double or of two sorts. Thus far he says Sir Isaac Newton was acquainted with the process. The first part, till one comes to the separation of the two liquors, is mentioned by Caneparius in his book *De Atramentis*, first printed at Venice, and afterwards at London; then by the great Mr. Boyle, afterwards by Sir Isaac Newton."

It remains only to append Godfrey's own description:—"Dr. Frobenius, a German Physician, produced a Liquor (which he called Spiritus Vini Æthereus) before the Royal Society at London, on Nov. 18, 1731. It was of a surprising subtility, and was prepared out of a certain proportion of Alcohol and Oil of Vitriol. A small quantity of this Liquor poured on the hand, with a blast from the mouth, it would instantly dissipate and ascend towards its proper region, forsaking the terrestrial gross bodies, which are heterogeneous to it, and uniting with the more subtile, to wit, Æther. I have prepared the Æther or Ætherial Spirit in the following manner:—Take Spirit of Wine, Rectified Oil of Vitriol,

āā lbij. Put the Spirit of Wine into a retort, and by degrees put the Oil of Vitriol to it. Distil off about half, and preserve it well stopt, and rectify it *in balneo*, drawing off about one half, that you may have the æther fine and subtile. It must be rectified with so gentle a heat, that the upper part of the retort must not be hot. If the distillation is continued, there comes over a yellowish Liquor, which may be made fine by adding some Lixivium of Potass to it, and letting it stand awhile to separate. Then it may be done by a separating glass called Tritorium.—The Lixivium. Dissolve Potash lbj. in Distilled Water lbj., and filter through filtering paper."

Hard work guided by common sense had now wrought out for Godfrey a tolerable reputation. A certain Dr. Caspar Neuman, Professor of Chemistry at Berlin, made sundry minute investigations into the nature and composition of Ambergris, the result of which was communicated to the Royal Society in a laborious Latin Essay. Not satisfied with taking things on trust, Godfrey and a Dr. John Browne were commissioned to examine Neuman's researches, and to furnish a critical report. "Mandatum fuit chemicis expertissimis Regalis Societatis sociis dignissimis Dominis Browne et Godofredo Hanckwitz ut operationem de Ambrâ gryseâ à clarissimo D. Neumanno chemiæ professore et R. S. S. institutam sedulo repeterent." Dr. Browne arrived at this conclusion:—"Since therefore neither acid nor volatile principle could be extracted from it, he leaves it in doubt whether Ambergris be an animal excrement or not, but he remarks that the whole of its sweet smelling, agreeable odour is dissipated by the application of the gentlest heat."

Godfrey, for his part, set to work methodically. "First, he distilled in a retort two ounces of Ambergris, mixed with double their weight of very pure white sand. Secondly, he distilled two other ounces in a similar manner; and he obtained in both operations a limpid oil and a bituminous residue. The oil, when rectified *per se*, yielded a phlegm (watery liquid) of a pleasant, slightly acid taste, like dilute Vinegar, and afterwards an oil which was limpid, balsamic, bituminous, resembling Petroleum. Thirdly, he distilled half an ounce of Ambergris *per se*, and obtained the same results with the application of moderate heat. After he had distilled the Ambergris to actual dryness, he burnt the residue at a calcining heat, and there remained at last three grains of white saline earth, effervescing moderately with acids, and deliquescing when exposed to a moist atmosphere. Since he could produce neither Volatile Salt nor Phosphorus from the charcoal or black residue of the two first operations, he pronounces without doubt (pronuntiat certissimè) that Ambergris is neither an animal substance nor an animal excrement. For that Phosphorus can be obtained from the excrements of all known animals, as he has fully explained in Transaction No. 428. Ambergris, therefore, he maintains is a Bitumen, very analogous to Amber; but he does not allow it to be Amber, since it does not yield an acid volatile salt, similar to that obtained from Amber.

"The same experiments were repeated with Ambergris and powdered glass in equal proportions, to avoid the possibility of any alcaline matter being retained by the sand, which would prevent the determination of an acid, if indeed any existed. Results identical with the former were obtained, and the opinion of Neuman was confirmed, that Ambergris was a compound substance, not a simple body, as a metal; that it was not the same as Amber, but only one of the Amber series, or a bitumen that most closely resembled Amber."—*Philosophical Transactions*, vol. xxxviij., page 437, date December, 1734.

Boyle, "Godfrey's honoured master," entertained a private theory on Ambergris, derived from a different authority. This unwearied investigator once met with a gentleman who had been Deputy Governor in the East India Company, who gave him as a curiosity the following translation of a Dutch manuscript:—

"Amber-Greece is not the scum or excrement of the whale, &c., but issues

out of the root of a tree, which tree, how far soever it stands on the land, always shoots forth its roots towards the sea, seeking the warmth of it, thereby to deliver the fattest Gum that comes out of it; which tree otherwise, by its copious fatness, might be burnt and destroyed. Wherever that fat gum is shot into the sea, it is so tough that it is not easily broken from the root, unless its own weight and the working of the warm sea doth it, and so it floats on the sea. There was found by a soldier $\frac{7}{8}$ of a pound, and by the chief two pieces, weighing five pounds.

"If you plant the trees where the stream sets to the shore, then the stream will cast it up to great advantage." (March 1, 1672, in Batavia.)

Boyle, in his account of the affair, laments that he had no subsequent opportunity of being further acquainted with a gentleman who might have thrown much light on many disputed points in Materia Medica.

In these electric days, in which the Atlantic Cable has annihilated time and space, it is refreshing to contemplate occasionally some of the less speedy operations of our forefathers, and certainly in nothing has the modern Chemist outstripped his predecessors more than in the art of Analysis. I cannot, therefore, forbear transcribing an original specimen of a style of investigation which has of late been rendered somewhat more concise.

"An examination of the Westashton Well-waters, belonging to Thos. Beach, Esq.; a well about four miles from that of Holt; by Ambrose Godfrey Hanckwitz.

"Obs. 1. I took four ounces of the Westashton water, with as much milk, and set them on the fire; as soon as they boiled, the milk began to curdle, which denotes a brackish salt of a neuter nature. The water changes syrup of violets green.

"Obs. 2. Some powder of Galls infused in this water, gives it a tinge of a brown purple, by which it appears that this water is chalybeate. For all martial waters will, with Galls, turn blackish or inky.

,'Obs. 3. A fixt Alcali, as Ol. Tartar per deliquium, and a volatile one, as Sp. Sal. Armoniaci, caused a white precipitation, the which denotes an aluminous, cretaceous earth.

"Obs. 4. A solution of salt of Lead causes a cream like, or a troubled milky colour.

"Obs. 5. The usual acid Spirits, viz. Spirit of Salt, Nitre, and Vitriol, cause no alteration; the which shows that the water is itself impregnated with an acid.

"Obs. 6. The water, being evaporated to a pellicule, deposits saline crystals of a rough or austere taste, being of a styptic nature, and separates a martial yellowish okre (which is attracted by the loadstone), and is an absorbent, for it ferments with acids. The remaining Brine, being evaporated to dryness, leaves a salt of a lixivious alcaline taste.

"Obs. 7. Some of these salts being put into water, three parts out of four dissolve very readily, but one fourth part will not dissolve at all, but is of a talcky nature, and unalterable in the fire. Hence we may observe, that Chalybeat waters, as long as they retain their natural sulphureous gas, are capable of keeping suspended, or floating in them, these talcky substances; but that boiling drives away that sulphureous gas, upon which this talcky substance subsides, and cannot again be dissolved in water, and remains fixt against the power of the fire; for it suffers no alteration upon a red hot iron, neither emitting flame nor melting, as neither does the talck itself.

"Obs. 8. These chalybeat waters contain somewhat of the same nature as our cathartic Epsom Salt, only not so mild upon the tongue; for by this examen, when their gas is gone, they are found to contain two sorts of such like earths; the one absorbent, fermenting with acids, and the other fixt or talcky. And that this substance is really talcky, is confirmed by the digging up of a pretty deal of talck in the sinking this well.

"All the salts of the medical waters are more generally alcaline than acid,

being of a martial nature, impregnated with Sulphur, which gives them a muriatic taste.

"We may hence conclude that this Westashton Water is a very good chalybeat water; and by report, more plentiful and more constant all the year round, than the well at Holt, which spring diminishes much at a certain time of the year; but both seem alike for their virtues and physical use, being both alike martial."—*Philosophical Transactions,* vol. xli., page 828, date 1741.

A life consecrated to science is necessarily barren in biographical incident; the drummer-boy who follows his regiment has been thrown in contact with more interesting events than the most distinguished philosopher, with this difference, that the philosopher dies to be remembered, and the drummer-boy lives to be forgotten. Godfrey must now appear in the new character of a business man. Dating from his encounter with Mr. Bilger, his success seems to have been secured; his pecuniary prospects brightened, and in 1680 he founded the house which still bears his name. It is something to the credit of a poor German boy from Frankfort that he won for himself a London reputation, ceased to be the workman and became the friend of Boyle, and originated a great firm which has lasted from that day to this. For obvious reasons I confine myself to strictly historical details. Nor will it be considered overstepping the boundary mark of discretion, if I subjoin Godfrey's original advertisement. My copy is in French.

"Ambrose Godfrey Hanckwitz, Chymist in London, Southampton Street, Covent Garden—continues faithfully to prepare all sorts of remedies, Chemical and Galenic. He hopes that his friends will continue their favours. Good cordials can be procured at his establishment, as well as Royal English drops, and other articles, such as Powders of Kent, Zell, and Contrajerva, Cordial Red Powder, Gaskoin's powder with and without Bezoar: English Smelling Salts, true Glauber Salt, Epsom Salt and Volatile Salt of Ammonia stronger than the former. Human Skull, and Hartshorn. Essence of Ambergris, Volatile Essence of Lavender, Musk and Citron. Essence of Viper, Essence for the hair. Vulnerary Balsam. Comendeur. Balsam for Apoplexy. Red Spirit of Purgative Cochlearia, Spirit of White Cochlearia and others. Honey Water, Lavender Water of two kinds, Queen of Hungary Water, Orange Flower Water and Arquebusade. For the information of the curious, he is the only one in London who makes inflammable Phosphorus, which can be preserved in water. Phosphorus of Bolognian Stone, Flowers of Phosphorus, Black Phosphorus, and that made with Acid Oil, and other varieties. All unadulterated; every description of good drugs. He sells wholesale and retail. N.B. He sells solid Phosphorus wholesale fifty shillings an ounce, and retail, three pounds sterling the ounce."

Time the destroyer has borne hardly on some of these valuable preparations; the powders of Zell* and Kent† are unknown to fame—human brains are bought

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* Pulvis aureus of Zell.—It is good in weakness and faintness, for both man and woman, or for such that have the palpitation of the heart, or have a trembling, or in palsie, or apoplexy; and against all lowness of Spirit, for it enlivens, and this is therefore a very cordial, ready at any time when you do not know what to take, and a very good stomachic at any time; to be taken a lick of it now and then, to the quantity of a pea or bean; also for weak stomachs to take of it before or after dinner, or both. It strengthens digestion and creates also a sweet breath, and resists putrid air.—*Compleat Course of Chymistry* (by Ambrose Godfrey, Jun.)

PULVIS ZELL.

℞. Sacchari Pulv., ℥iv.
Ol. Cinnam., gtt. xl.
Carmine, gr. xx. ℳ.—Godfrey, Sen.

† Kent's Powder.—It is a cordial powder and a great Alexiteric; may be used at any time, in all cases where testaceous powders are necessary, and it proves Diaphoretic generally; therefore not only good in cordial potions, but in measles and small pox. And it is also a good

and sold as much as ever, but not over a Druggist's counter: the market value of Phosphorus has ingloriously declined, but I am happy to inform the curious that a quantity of Essence of Viper,* which our forefathers had the wisdom not to trouble, still remains on hand.

Three engravings of the old laboratory are extant: the first represents the whole method of making Phosphorus; the second is a view of unwieldy stills and retorts in full operation; and the third is meant to give an idea of various pharmaceutical processes. In this last engraving an open door discloses a spacious garden, while close by an ancient clock, and beneath the portrait of the proprietor, an elegant gentleman is discoursing to a lady, both in the costume of the period. Of the three furnaces built under Boyle's superintendence one only is left, and is now devoted to the utilitarian purpose of making charcoal; no garden invites the willing customer to enter, and the leviathan retorts have disappeared. In other respects the laboratory remains the same, no patent apparatus has disturbed its peace, and it is not yet overrun with the manœuvres of modern Pharmacy, nor under the present management is such a catastrophe to be apprehended.

Godfrey died January 15th, 1741. He left three sons, Boyle, Ambrose, and John; all three inherited the father's passion for literary composition. Ambrose wrote a "Compleat Course of Chymistry, in four manuscript folio volumes;" Boyle turned Physician, and wrote his Observations; and John was early in want of that necessary article, the current coin of the realm, and wrote begging letters to his friends. The last descendant of the Godfreys walked in the footsteps of his ancestors, and brought out a fire annihilator, introducing it to the notice of the public in a descriptive pamphlet. Some antiquarian friend has relieved me of my copy, and should this chance to meet his eye, he is requested to return the document to its lawful owner. An engraving faced the title-page; the principle of the machine was that of a shell, that was to be projected into the burning mass, and burst with explosive violence. The annihilator was brought under the notice of William Pitt, but it is perhaps needless to state that the failure of the apparatus served only for a time to damp the fire of the inventor's genius, without exerting an equally beneficial influence on the houses of the nobility and gentry.

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antepileptic, epileptic, and for other diseases of the head, and very fit to be used in all fevers. 10 or 15 grains scraped off with the point of a knife, and mixed with a little Syrup of Clove-Gilly flower, and Black-cherry water, or carduus water. Some take it in wine.—*Compleat Course of Chymistry.*

THE COUNTESS OF KENT'S POWDER.

℞ Crab's Claws, ℥xvj.
Crab's Eyes, ℥viij.
Red Coral, ℥vj.
Cornu Ust.
Pearls.
Amber.
Contrajerva, āā ℥iv.

Made into balls with mucilage of Gum Tragacanth, and gilded. A small quantity of Viper Powder belongs to this composition, but I do reject it, because it has an ungrateful smell, fouls the medicine, and its virtue is insignificant.—Godfrey.

* Sal Viperarum.—Is from 5 to 10 or 15 grains, according. You take it in fair water, or sac mixed with water; and this do once in 24 hours, or if need twice a day, mornings and at nights. And that cures putrified blood and resists putrefaction; therefore it is used in Epidemic distempers, and in fevers where there is obstruction and stagnation in the blood. It is good in malignant contagious distempers. If it be in malignant fevers, you repeat it often, till there be a crisis of the distemper perceived; and it is very good against the bite of venomous creatures, and against all immundicities of the skin that the blood has thrown out. It is therefore used in leprosy and scurvy with good success.—*Compleat Course of Chymistry.*

Dried Vipers, by destructive distillation, yield a water, oil, and salt. These are again distilled, and the volatile salt remains in the neck of the retort. Godfrey's Viper preparations are multifarious.

There are two portraits of Godfrey, both tolerable specimens of art; the one dated 1738, being the traditional engraving, by which he is best known. Beneath the figure Phosphorus is represented, "urens igne suo," whilst a scroll exhibits his own favourite motto, Vivens, Explorans. The other is by Vertue, dated 1718. (This is the engraving mentioned in Brande's Chemistry, article Phosphorus.) In this portrait Godfrey appears in all the dignity of a court dress and flowing wig, which latter is ample enough to create him a Solomon, if it be true that wisdom resides in that article of dress. The distinguished gentleman is surrounded by well-chosen apparatus. Phosphorus glows at his feet; to the right the process of distillation is briskly going on, with the motto, "Natura impurum dat, rectificatio mundat;" on the left is a lighted still furnace, on which is inscribed "Ignis adest opifex, perficit arte manus," the receiver being labelled with the consoling thought, "Post pugnam unio et lux." A curious allegorical landscape forms a sort of basement. The left reveals a stag and trees, on both of which the sun is shining; to the extreme right men are digging into the bowels of the earth, while in the centre the phœnix rises from its ashes. The whole is surmounted by a motto, which renders the meaning plain, "Naturæ regna instar Phœnicis per ignem reviviscunt"—in other words, fire is the great restorer; by its means the operations of Chemistry are performed, as nature itself, under the influence of the solar fire, is kindled into new life. This engraving was Godfrey's parting gift to his friends on leaving England for the Continent, as we read, "Hâc Amicitiæ tesserâ Fautoribus valedicit Peregrinaturus Ambrose Godfrey Hanckwitz, Chymicus ad Phœnicem, Londini."

"The Chemist at the sign of the Phœnix, London," little dreamt of the future destiny of his patron bird. This feathered emblem of Pharmacy, with the well-known motto, "Exuviis positis vegetior," has since become a favourite sign amongst the community of Druggists, and continues to rise with stereotyped equanimity from the flames. Yet in its day it suffered many things at the hand of the engravers, and was made to pass through a variety of transformations, starting from the depth of ugliness until it finally emerged into public life the highly respectable old bird it now appears. Peace to its ashes! Peace also to the memory of the illustrious German, to whom, in January 31, 1719, there came a letter safely from Berlin, bearing the simple inscription, "For Mr. Godfrey, famous Chymist in London." His memory still lives—he worked too laboriously and too conscientiously for it soon to die.

Were I to attempt an analysis of Godfrey's character, I should say that to natural shrewdness he united the most plodding industry. He rose far beyond mediocrity, but not as high as genius. In his own day he was a living illustration of the truth, that he that walketh with wise men shall be wise. His profound admiration for real excellence betrayed him sometimes into lending a too credulous ear to the pretensions of theorists and schemers—a weakness for which he is not to be harshly judged, since, from the days of Tacitus down to yesterday, the unknown has been mistaken for the wonderful.

His writings are extremely interesting, owing to a quiet vein of pleasantry which enlivens his abstrusest passages. He had the sense to know that in order to be learned, it is not essential to be dull.

Some of his dissertations would provoke a smile; but I am not disposed to ridicule his crude conjectures, nor those of any other experimental philosophers. To their guesses after truth we owe our facts; their scanty glimmerings ushered in our light.*

Let not the children of the nineteenth century be ashamed to learn something from the past. Ours is an age of competition, which forces us often against our will to judge hastily, to produce rapidly, and to learn superficially. For us,

* "It teaches us to be *neglectful* of nothing—not to despise the small beginnings, for they precede of necessity all great things in the knowledge of science, either pure or applied."—*Faraday.*

then, it is specially useful to go back, if only in thought, to the careful and deliberate studies of our ancestors: and should any modern Chemist be tempted to forget that nothing is refused to industry, and that labour conquers all things, let him turn to the record of the patient and successful strivings of Ambrose Godfrey Hanekwitz.

31, *Southampton Street, Covent Garden.*

ARSENIC IN PAPER HANGINGS.

BY WILLIAM HINDS, M.D.

Certain carefully-prepared papers, which recently appeared on the above subject in the pages of the *Pharmaceutical Journal*, not having been, so far as I am aware, fully replied to, I beg to offer to the readers of the above interesting journal a few observations on this subject. Great confusion of ideas seems to prevail extensively as to the facts brought before the public, while even the deleterious influence is itself denied in some quarters. It is by no means uncommon to see theoretical denials and disputes by some persons, in reference to facts and truths, which are nevertheless characterized by such stern features as to be realized *as* facts and truths by others. The views advanced by myself and others as to the injurious effects of arsenical papers in rooms, I believe to be unquestionable. Arsenite of copper, as a poisonous pigment, I find frequently recognized by writers on medical jurisprudence; but so far as I have been able to learn, to Dr. Alfred Taylor belongs the merit of more especially commenting upon the dangers to be apprehended from its employment. In his invaluable work, Dr. Taylor gives a case, in which "a young man, after having been engaged for nine days in printing with this arsenical green, was seized with earyza, swelling of the lips and nostrils, and headache. The next day he experienced severe colic and great muscular weakness." Dr. Taylor adds the valuable remark, that "in this case the arsenite of copper had been taken into the body in the state of fine powder."

This shows that Dr. Taylor's attention had been specially drawn to the subject. At the same time I may remark, that to the best of my knowledge, no case of actual poisoning had ever been made public, as having occurred from simply inhabiting a room hung with the arsenical paper, until my own case was published in the *Medical Times and Gazette* in February, 1857. The accident occurred to me as far back as 1849; but the case being, as I then thought, so unique and unparalleled, I hesitated to publish it until I had had means of collecting other cases, or until a favourable opportunity.

The way in which I was led, step by step, to certain conclusions as to the injurious effects, and also a description of these effects, are given exactly as they occurred in the paper mentioned, and to which I beg to refer those who may feel an interest in this subject.

In the next cases which came under my notice, the moral force of the evidence was so strong, as to satisfy the most sceptical. The injury occurred to a Mr. Simpson, of this city, and to his wife. Mr. S. had enjoyed the best health until he had a green flock paper put on the walls of two sitting-rooms. In a very few days he experienced all the symptoms of slow arsenical poisoning, but without either believing in, or even suspecting the cause. He became seriously ill, as also did his wife; and a fine parrot, which was hung in one of the rooms, all at once drooped and refused food. At this stage a gentleman, who had known of my own case, suggested a solution of the mystery as to the cause of the illness, but Mr. S. repudiated the supposition. He then left town for his health, returning in a fortnight quite strong and vigorous, and confident he should continue so. In several days he became again seriously ill, and after

long residence, he became deeply convinced, by the very force of circumstances and suffering, that the cause lay in the wall paper. He underwent the expense of an entire removal of the paper, and soon after all were well. The gentleman here mentioned, would, I am sure, be glad to give his experience to any person who might be sceptical as to the facts.

Mr. S.'s case is fully detailed, without names, in the scientific journal before named, for May, 1857.

In the case published by Dr. Halley in the *Times* newspaper, the facts and results are as striking and forcible as in the other published cases.

I have to say one word as to the mode of escape from these arsenical papers of the poisonous colouring matter, and I must observe that a vast deal of entirely irrelevant speculation and equally futile experiments have been expended, with a view to disprove facts; about which it is astonishing that any reasoning person can have a just doubt. A sample of this irrelevancy I will presently mention.

I find papers in this journal for May and June, evidently from able contributors, denying our conclusions, which the space I could request would not enable me extensively to notice. For this, however, there is the less necessity, inasmuch as these writers give but negative results for the most part. I believe I am justified in saying that our positive facts and forcible moral evidence are not shaken by mere negative results, and miniature and usually irrelevant experiments. Neither is the question a mere chemical one, to be easily decided in miniature. The existence of the poisonous ingredient upon the paper is admitted, though one gentleman seeks to spoil this admission, by asserting (truly enough) that the flock portion is a mere dyed stuff, and contains nothing injurious. The injurious effects, moreover, of arsenite of copper, when inhaled, are equally admitted. Now, that mere water-colour pigment, without an overcoat of varnish, will give off, under certain hygrometric conditions, particles of its dust to the atmosphere, is perhaps so self-evident as not to require any laboured proof. The fact is indeed unquestionable. Take a feather or a soft white napkin, and run either never so lightly over a green paper of the ordinary kind, after it shall have been placed upon a wall by means of paste, and myriads of particles of the colour from the surface will adhere. Much, of course, is sent floating in the atmosphere of any room by the least possible disturbance of its contained air, as by draughts or the opening of doors. These particles will be then breathed into the lungs, and produce all the symptoms which have been described. A great deal has been said about volatilization of arsenic and arsenical vapour, but it is not all to the purpose. Dr. Taylor's idea, as given in this journal for May last, and the same as presented itself to me in the first case published, is, I believe, the only rational one—namely, that the finer and lighter particles of the colour escape as such. Now, what is the *dose* of this fine powder of Scheele's green necessary to produce bad symptoms? That is a question to which I cannot give an answer. Probably it is extremely small in quantity. Dr. Taylor, whose labours place him at the head of his department, in this country at least, has not attempted, so far as I know, to give a reply to this question; and the means by which the deleterious particles become active in the system, present several difficulties not easily to be solved.

There is one experiment I would beg to urge strongly upon the gentlemen who are sceptical as to our facts. It is that they should place themselves in the same conditions as those under which our facts were gathered. I shall be happy to furnish any gentleman, who may wish to make the experiment, with samples of arsenical paper from which to select. Let a room be papered with one of these, and let the experimenter undergo the same experience as we who have suffered, and I shall have little doubt that he will come out of the trial fully convinced. It would be still better to make a series of trials, in order to avoid any incidental negation.

I may here mention the fact of the universal testimony of workmen who have

been in the habit of hanging green papers, to the often severe symptoms which they experience while at work. One most powerful man, a paper-hanger, told me he has repeatedly got so ill with caryza, dryness of throat, and prostration, while hanging green paper, that he has been compelled to leave the room, and become unable to finish his work. This man could tell me himself that green paper was very injurious, though he was surprised to be told that the colour was arsenical. It is a fact worthy to be borne in mind, that in all these cases the *symptoms* were of the kind indicative of slow arsenical poisoning—namely, gastro-enteritic irritation, with intermittent colicy pains, nausea, prostration, loss of muscular power, caryza, heat, and dryness of throat; and, moreover, that in every case the cause was at first entirely unsuspected by those who suffered. In my own case I had not previously given the least notice to the colour of the paper, and did not trouble myself with any examination of it. It was only after suffering illness that my attention was gradually attracted to every altered condition of the room in which I sat to read. I had previously used the room for years with no inconvenience. The symptoms came on in three or four days after the papering. They ceased on my ceasing to occupy the room. They recurred every time I had for some hours again used it, and they never after appeared after the room was stripped of the injurious paper. The very same conditions, or very similar, were experienced by Dr. Halley, whose communication on the subject appeared in the *Times* of the 11th of January of the present year; and the same also in Mr. Simpson's case, to which I have before alluded.

I will now give a specimen of the "experiments" by which the facts we bring forward have been met. Several experiments have been detailed in this journal by Mr. F. A. Abel. I desire to be entirely just to Mr. Abel's efforts, but I cannot think his scientific knowledge was present to him at the time of those experiments. I will explain my meaning. On coming to the seventh experiment, Mr. A. makes the following most remarkable statement:—He says, "It should be mentioned that in all these experiments, the *tube* was plugged with cotton wool." Now we refer to the other conditions of these experiments, and we find that the *temperature* is raised to only 90° on the one hand, and on the other, the tube was plugged with cotton wool, to allow no particles to escape mechanically! Mr. Abel will forgive me for reminding him of a fact he already knows—namely, that arsenic can only be volatilized by heat, at a temperature of 380°; and yet he sticks to 90°, and plugs the escape-tube with cotton wool, to prevent the mere mechanical passing of arsenic. I am sure Mr. A. will see the entire inconsistency and inapplicability of his whole experiments, on a reconsideration of the subject.

In Mr. Dugald Campbell's experiments, given with candour and clearness, the conditions were essentially different from those in which arsenic is given off in a room; for while the 140°, the highest point to which Mr. C. raised the temperature, were less by no smaller a quantity than 240° than the temperature required for the volatilization of arsenic; a square foot only of paper, and *confined in a bottle*, is a very different thing from a square foot, indeed I might add 500 square feet, or 1000, pasted upon a wall, and subject to certain important hygrometric transitions, which favour the loosing of the colour, and its escape into the atmosphere of the room.

Some observations have also been made in the journal by Mr. B. H. Paul, and are given with great candour. Those remarks contain no experiments on the subject in question, and as they are directed more especially against the gratuitously-conceived theory of vaporization of pure arsenic by heat, inapplicable in the present case, require little remark. In conclusion, I may express my regret to perceive how completely an ascertained fact, as communicated by Dr. Taylor, in reference to the actual observance of particles of Scheele's green upon a slip of glass, can be ignored by a mere surmise.

ARSENIC IN PAPER HANGINGS.

In the Journal,* vol. v., p. 652, reference was made to the evidence of Dr. Alfred Swaine Taylor, given before a Committee of the House of Lords on the "Sale of Poisons Bill," in which he spoke of the injurious effects of paper-hangings coloured with arsenite of copper. Some of the rooms in the new offices of the Inland Revenue Department being hung with these papers, and the attention of the Commissioners having been called to the circumstance, they directed Mr. Phillips, the chemist to the Board, to investigate the subject.

The following is the report:—

"In the *Pharmaceutical Journal* for February last, page 429, it is stated that Dr. Halley, of Harley Street, had detected arsenious acid in the atmosphere of his study, the walls of which were covered with green paper, and that the test he employed was 'sheets of paper soaked in a solution of ammonia-nitrate of silver,' and that upon this paper were deposited numerous well-defined crystals of arsenious acid, visible under a low power with the microscope, and that the form of these crystals precluded the possibility of a mistake.

"Ammonia-nitrate of silver is a test of arsenious acid, but not in the manner which Dr. Halley seems to suppose, as it does not cause the deposition of crystals of arsenious acid (which are colourless), but produces a bright yellow precipitate of arsenite of silver, provided the amount of ammonia present in the test be very exactly proportioned to that of the nitrate of silver. If such be not the case, no precipitate is produced. These particulars are mentioned, because Dr. Halley appears not to have resorted to any other test, but to have concluded merely from the appearance of the crystals formed on his test-paper, and without analyzing them, that they must be those of the poison in question.

"In the following experiments, made with a view to test Dr. Halley's conclusions, the interior surface of two closets were covered with green paper similar to the pattern annexed.

"Closet A had a capacity of 17 cubic feet, and was lined with about 48 square feet of the paper, or 2.8 square feet to each cubic foot of space.

"Closet B had a capacity of 28 cubic feet, and was lined with 53 square feet of paper, or 2.0 square feet to each cubic foot of space.

"These closets had no means of ventilation beyond the chinks round the doors; the included air, therefore, would remain much longer in contact with the paper than would be the case in an ordinary room. The surface of the paper to the bulk of air enclosed was not less than fourteen times as great as it would be in a room 20 feet square and 12 feet high, thus showing that the conditions of the experiments were highly favourable to the impregnation of the air with arsenious acid if such were possible. In each of these closets were placed two basins, one containing a solution of potash, the other ammonia-nitrate of silver, and a sheet of paper saturated with the latter reagent. Closet A was kept as much as possible from the influence of common gas. In closet B gas was allowed to burn during the daytime, the temperature of the included air being kept by the flame at from 74° to 82° F. The closets were carefully closed for 72 hours, the gas burning during that time 45 hours in closet B. The solutions of potash and ammonia-nitrate of silver from each closet were then examined by Marsh's test, which is by far the most delicate known, and found to be quite free from arsenic.

"The sheets of paper saturated with ammonia-nitrate of silver were also free from arsenic, but had on their surface numerous colourless crystals, which, when analyzed, proved to be nitrate of silver, the evaporation of the water from the test-paper having concentrated the solution with which the paper was saturated to such an extent as to cause the nitrate of silver to crystallize out. On the test-paper was also found an amorphous substance having a dingy yellow colour, which speedily became black on exposure to light; the same substance was also observed on the surface of the ammonia-nitrate of silver contained in the basins, being most abundant in that which had remained in closet B, in which gas had been burnt. When analyzed, it was found to be sulphide of silver, the sulphur no doubt having been derived from the atmosphere of the laboratory, which always contains traces of

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* *Journal of the Society of Arts.*

sulphuretted hydrogen. This dingy yellow substance, which, without analysis, might be supposed by some to be arsenite of silver, was formed in a third closet, in which no arsenical compounds were present, thus proving that the green paper had no share in its production.

"The green paper used in the experiments is coloured with what is known as emerald or Schweinfurt green, which is a compound of arsenite of copper and acetate of copper. The paper contains 11.8 grains of arsenious acid to the square foot.

"The following conclusions may fairly be drawn from the experiments above described :—

" 1st. That even when a small bulk of air is allowed to remain for a considerable time in contact with a large surface of the arsenical paper, and that too at a temperature of 80° F., not the slightest trace of arsenious acid is diffused in the air. Still less might the air of an ordinary room, which occupies a large space in proportion to the surface of the walls, and which is being constantly changed by ventilation, be expected to become contaminated by the poison.

"2nd. That the products of the combustion of gas do not facilitate the liberation of arsenious acid from the surface of the green paper.

"3rd. That arsenious acid is not volatilized from the surface of such paper except at temperatures too high for human endurance.

"It is probable that persons may have been affected by inhabiting rooms papered with arsenical hangings, not because the arsenious acid has been volatilized, but from the improper and frequent sweeping of the walls, by which minute particles of arsenite of copper might be detached from those portions of the surface of the paper which were not glazed, and becoming dispersed in the air, might be inhaled by persons occupying the room at the time. This only source of danger, which might be obviated by a little management in the cleaning of a room, and caution in the selection of a paper having but a little of its surface unglazed, appears not to have presented itself to the mind of Dr. Halley, who seems to have been possessed with the idea that injury to health was to be apprehended solely from the vaporization of the arsenious acid. Dr. Taylor, on the other hand, ascribes the danger to the fact that the colour is 'put on very loosely,' and therefore, by inference, easily detached and disseminated through the air, not as vapour of arsenious acid, but as minute particles of arsenite of copper.

"The subject under consideration being one of much importance, I have felt it necessary to enlarge upon it, and as Dr. Halley's statement is calculated to create an apprehension of danger which I believe has no existence, I beg to make the following remarks :—

"Dr. Halley states that on two occasions distinct crystals of arsenious acid were deposited on the surface of his test-paper from the air of his room. It is more than probable that if he had analyzed the crystals, and not assumed their composition from their appearance under the microscope, he would have found them to be nitrate of silver. The test-paper which he used had no more effect in causing the deposition of crystals of arsenious acid than any other surface in the room would have, and to suppose that crystals of the poison were thus deposited, would be to imply that the air was impregnated with arsenious acid to an extent which must be fatal to persons inhaling it for a short time. Notwithstanding his statement that the air of his room furnished crystals of arsenious acid, he subsequently says that, at ordinary temperatures with common atmospheric air, even when an aspirator was used, the amount of arsenic given off was 'inappreciably small,' omitting to mention what test he employed to detect a quantity not appreciable. The purport of his remarks, however, appears to be that arsenious acid to an appreciable extent is only given off from arsenical paper in rooms in which gas is burnt, and that the products of the combustion of the gas combine with the arsenic in the paper. If such be the case, it is difficult to conceive how the arsenious acid can be deposited from the air of the room in a free and crystalline state.

"It may be proper to mention that I and my family occupied a sitting-room three years, the walls of which were covered with paper heavily laden with arsenite of copper, and that for the same period my bedroom was also papered with arsenical hangings, yet neither I nor any member of my family experienced the slightest ill effect from such paper.

"In conclusion, I beg to express my opinion that no danger need be apprehended

from a paper such as the one annexed, in which but a small proportion of the surface is unglazed, provided ordinary care be used when removing the dust from the walls, and that even if such care were not exercised, it is doubtful whether any pernicious effects would be felt by those inhabiting the room.—*Journal of the Society of Arts.*

TEST FOR CINCHONINE.

BY J. W. BILL.

In some investigations still in progress on some of the alkaloids, it became a matter of importance to discover a good test for cinchonine, delicate and characteristic, and distinguishing it especially from quinine.

We think we have found such a test, and as we believe it to be a reaction not before noticed, at least not applied to the above purpose, we will anticipate the results of the above-mentioned investigations, and give the test by itself.

When ferrocyanide of potassium is added to a salt of quinine in the cold, a yellowish white cloudy precipitate falls, provided the ferrocyanide be not added in excess; otherwise nothing characteristic results. This precipitate is soluble by heat, and readily so in solutions of ferrocyanide of potassium without any subsequent change occurring in the solution. If ferrocyanide of potassium be added to a soluble salt of cinchonine, whether added in excess or not, whether added to a strong or weak solution, a yellow white precipitate falls. If a very gentle heat be now applied, this precipitate dissolves, but as the liquid cools again, a crop of splendid yellow (gold-yellow) crystals falls so abundantly as sometimes to give a gelatinous appearance to the mass. These crystals are flat plates, cuneiform in shape, a pure lemon-yellow in colour, and superimposed one upon the other in the same way as are crystals of nitrate of urea. The crystals are best observed under a low magnifying power, fifty diameters, and will then be found such as we have described them. The *precipitate* is not soluble in excess of ferrocyanide of potassium, but like this the latter is decomposed by boiling with mineral acids. This test for cinchonine is a very delicate one, not less so than that by the biniodide of potassium, and is far more characteristic, since none of the alkaloids manifest the reaction except cinchonine. In practise it will be well, for obvious reasons, to use a slight excess of ferrocyanide of potassium, as little excess of acid as possible, and to heat the liquid very gently after the first precipitate has fallen.—*Silliman's American Journal for July* 1858.

REPORT OF THE
RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION,
AND OF THE
APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

BY B. H. PAUL, Ph.D.

(*Continued from p.* 174.)

Chemical History of Beechwood Creosote.—The great diversity of opinion that still exists as to the composition and relations of creosote, and the fact that it has frequently been confounded with an isomeric substance having the characters of an alcohol, have induced Hr. Hlasiwetz* to undertake some experiments with creosote, that he obtained from a factory in Moravia.

The first step was to obtain a large quantity of the compound of creosote with potash, in a state of absolute purity. Reichenbach has already shown that there is one such compound, and Hr. Hlasiwetz has obtained another.

The solution of creosote in alkaline liquids rapidly becomes brown when exposed to the air, and ultimately becomes viscous and tarry, so that there is considerable difficulty in obtaining the compound pure.

This was effected by Hr. Hlasiwetz by introducing potassium into creosote at 90° C., contained in a flask filled with dry hydrogen. After the first rapid solution of the potassium and evolution of hydrogen has considerably diminished, the liquid which still remains clear and but little coloured, is allowed to cool, and furnishes a greasy mass without any appearance of crystallization. It rapidly blackens when

* *Annalen der Chemie und Pharmacie*, cvi., 339.

exposed to air, dissolves in boiling alcohol, ether, and naphtha. In order to crystallize the compound, it was transferred while liquid and without contact of air, to a flask filled with hydrogen, and connected with a condenser as well as with a vessel containing ether. When a sufficient quantity of ether had been added for solution, the flask was closed and placed in a freezing mixture. The crystalline mass, when dried by pressure between paper was quite white; it was further dried in a vacuum over lime, and again crystallized from absolute alcohol. By this means it was obtained in long colourless needles, without smell, and could be kept without alteration. When it contains any mother-liquor it becomes brown. It dissolves in water with partial decomposition; the solution has an alkaline reaction, and acids separate the whole of the oil. The salt contains water, which may be separated in a current of dry hydrogen at 80° or 90° C. Analysis showed that it consisted of

				Calculated.
Carbon.....	57.50	.....	192	57.80
Hydrogen.....	6.67	....	21	6.35
Oxygen.....	—	.....	72	21.70
Potash.....	14.17	.....	47.2	14.50
			332.2	100.00

The estimation of the amount of water is very difficult, because the temperature at which the last portions are separated produces a decomposition. The formula

$$\left.\begin{matrix} C_{32}\ H_{19}\ O_7 \\ KO \end{matrix}\right\} +2 \text{ aq.}$$

requires 5.42 per cent. water, and in the estimation from 6 to 7 per cent. was found.

When solid hydrate of potash is dissolved in twice its weight of creosote, at 130° C., without access of air, in a capacious vessel, which is requisite, because the liquid froths up considerably, the solution transferred to a flask containing ether, and treated as above described, another compound of creosote and potash is obtained which has such a close resemblance to the above-mentioned compound in every respect, that they can scarcely be distinguished, except by the different amount of potash they contain. The latter compound is, however, soluble in water without decomposition, and may even be crystallized from water. Analysis gave:—

				Calculated.
Carbon.....	45.69	.....	46	45.28
Hydrogen.....	6.26	.....	13	6.13
Oxygen.....	27.06	.....	56	26.42
Potash.....	21.90	.....	47.2	22.17
	100.00		212.2	100.00

By drying at 80° or 90° C., the salt lost 16 or 17 per cent. of water; four equivalents of water would require 16.97 per cent.

The composition of these two may therefore be represented by the following formula:—

Acid Salt.		Neutral Salt.	
Hydrated.	Anhydrous.	Hydrated.	Anhydrous.
$\left.\begin{matrix} C_{16}\ H_9\ KO_4 \\ C_{16}\ H_{10}\ O_4 \end{matrix}\right\} +2$ aq.	$\left.\begin{matrix} C_{16}\ H_9\ KO_4 \\ C_{16}\ H_{10}\ O_4 \end{matrix}\right\}$	$C_{16}\ H_9\ KO_4 +4$ aq.	$C_{16}\ H_9\ KO_4$

The latter compound is obtained also by the reaction of creosote and potassium when the temperature is raised to 130° or 140°, and potassium added as long as there is any action.

The reaction of creosote with sodium and hydrate of soda are almost exactly similar to those with potassium and potash. In this case also the reaction appears to have two phases. When the temperature is raised only to the boiling point of water, a point is reached when the sodium is but little acted upon by the oil. If the temperature is raised, reaction commences again, and at 140° or 150° C. so much sodium is taken up that the liquid becomes viscous, solidifying when the temperature is lowered a few degrees. The same result is obtained with hydrate of soda. These compounds are, however, very deliquescent, and could not be obtained in a crystalline state like the potash compounds.

By the reaction of the neutral potash salt with iodide of ethyl, there was obtained an oil of slightly aromatic odour and a yellowish tinge. Analysis gave:—

		Calculated.	
Carbon.....	72.12	..... 72.28	$= C_{16}H_9 [C_4H_5] O_4$
Hydrogen	8.57	..... 8.43	
Oxygen	19.31	..... 13.29	
	100.00	100.00	

A large quantity of the oil existing in these compounds was prepared by decomposing the potash salt with dilute sulphuric acid. It was dried at a temperature of 150° to 160° by means of a stream of dry hydrogen. Chloride of calcium could not be used, because it dissolves in the oil. By rectification it is then obtained as a clear colourless oil. When distilled again, this oil commenced to boil at 212° C., the temperature rising rapidly to 219°, at which point the principal portion passed off. This oil is quite colourless, highly refractive, has the consistence of creosote, a very pleasant smell, somewhat resembling vanilla and Peruvian balsam, and a hot aromatic taste. It undergoes but little alteration when kept. Its density was 1.0894 at 13° C. By repeated distillations, in vessels containing air, it appears to be somewhat decomposed—the boiling point being raised a few degrees, and a brown residue remaining in the retort. When shaken with strong solution of ammonia, it solidifies to a pasty crystalline mass. This ammoniacal compound is very instable, and decomposed spontaneously by exposure to the air *in vacuo*. With an aqueous solution of perchloride of iron, it acquires a reddish-brown colour ; but an alcoholic solution, mixed with an alcoholic solution of perchloride of iron, produces a fine green colour.

The oil dissolves caustic alkalies with evolution of heat, and solidifies to a crystalline mass, that becomes brown by exposure to the air. Nitric acid acts very violently upon the oil, but no crystalline substitution products could be obtained. A few drops of the oil heated with dilute sulphuric acid give a violet-red colour. The analysis of this oil gave :—

							Calculated.
Carbon.....	69.37	69.64	69.83	.....	96	.....	69.56
Hydrogen.....	7.23	7.54	7.63	.....	10	.....	7.24
Oxygen.....	—	—	—	.....	32	.....	23.20
					138		100.00

These numbers agree with the formula C_{16} H_{10} O_4, deduced from the analyses of the salts. The vapour density of the oil was 4.98, and calculation gives 4.79.

With chlorine this oil yields a crystalline product, that corresponds to the formula C_{16} H_7 Cl_3 O_4.

The composition of this oil and its characters show that it is closely related to one of the constituents of the oil obtained by the distillation of guaiacum. But in this distillation a second substance is produced, which is homologous with the former. Both appear to belong to a series of which furfurol is also a member :—

Furfurol, C_{10} H_4 O_4.	Guajacol, C_{14} H_8 O_4.
? C_{12} H_6 O_4.	Creosol, C_{16} H_{10} O_4.

The chlorine compounds of xylone, prepared by Gorup-Besanez from creosote, may bear the same relation to the oil C_{16} H_{10} O_4, that the chlorinated hydrochinone would do to the diatomic alcohol of the phenyl series :—

C_{12} H_8 O_4 = H_2 + C_{12} H_6 O_4 ; C_{12} H_2 Cl_4 O_4.

C_{16} H_{10} O_4 = H_2 + C_{16} H_8 O_4 ; C_{16} H_4 Cl_4 O_4.—*Gerhardt.*

Solid Hydrocarbon from Wood Tar.—Prof. Fehling* has examined a crystalline hydrocarbon having the appearance of paraffin, but a very much higher melting point. By crystallization from alcohol, it was obtained as white micaceous laminæ, less bulky than naphthalin. The elementary analysis showed that its composition differs materially from that of naphthalin, as well as from that of paraffin ; the per-centage amount of carbon being 91.5, and that of hydrogen 8.4.

Concentrated sulphuric acid has not any action upon this hydrocarbon at the ordinary temperature, but above 212° F. it blackens it, and disengages sulphurous acid. By the action of chlorine this hydrocarbon is converted into a brown resin. Alkalies do not appear to have any action upon it.

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* *Annalen der Chemie und Pharmacie*, cvi., 388.

Glycerin among the Products of Vinous Fermentation of Sugar.—M. Pasteur* has found glycerin among the products of fermentation, to the amount of three per cent. of the fermented sugar. He states also that glycerin is present in all fermented liquids.

Preparation of Soda.—A patent† has been obtained by Mr. Newton for a communicated invention of a method for preparing alkalies. The reagent proposed to be used for this purpose is hydrofluosilicic acid. This is to be obtained by the action of steam upon a mixture of fluor spar and siliceous substances at a high temperature. This operation is to be conducted either in a reverberatory furnace or in iron retorts, and the acid obtained is to be condensed in the same manner as hydrochloric acid, or the vapour used at once for the decomposition of chloride of sodium. This salt, either in a solid state or in solution, is to be submitted to the action of hydrofluosilicic acid, so that hydrochloric acid may be disengaged, and the double fluoride of silicium and sodium produced. When sea-water or a solution of chloride of sodium is employed, the double fluoride precipitates, and is collected by filtration. From this salt caustic soda is to be obtained by digesting it with enough lime to combine with the fluorine and silicium, producing fluoride of calcium and silicate of lime with caustic soda that passes into solution.

By heating the fluosilicate of soda in an atmosphere containing steam, greater part of the hydrofluosilicic acid will be expelled, and may be again used. The residue, consisting of fluoride of sodium, may be converted into soda by means of lime.

The reactions that take place may perhaps be represented as follows :—

$$9\ Ca\ Fl + 11\ Si\ O_3 + 3\ HO = (3\ H\ Fl. + 2\ Si\ Fl_3) + 9\ Ca\ O,\ Si\ O_3\ ;\ \text{and}$$

$$3\ Na\ Fl + 2\ Si\ Fl_3 + 11\ Ca\ O = 3\ Na\ O + 9\ Ca\ Fl + 2\ Ca\ O,\ Si\ O_3.$$

Aluminium.—A patent‡ has been obtained for a method of preparing aluminium, which consists in heating the sulphide of that metal with anhydrous sulphate of aluminium or with anhydrous alumina, in an atmosphere free from oxidizing gases ; or in passing a current of hydrogen through the red-hot sulphide, while air is excluded.

Detection and Separation of Arsenic, Antimony, and Tin.—Prof. Bunsen§ finds that the reactions of the three oxides of antimony with hydriodic acid and nitrate of silver and ammonia, furnish the best means of recognizing these substances.

Antimonic acid and antimoniate of antimony dissolve, even after having been ignited, in hydrochloric acid, when some iodide of potassium is added, and the mixture is gently warmed. The liquid assumes a dark colour, owing to the elimination of iodine, which is dissolved by the excess of iodide of potassium

Oxide of antimony, on the contrary, is dissolved by the acid without elimination of iodine, giving a pale yellow solution.

Since there is only an iodide corresponding to oxide of antimony, SbO_3, and not one corresponding to antimonic acid, SbO_5, there is produced in the first case SbI_3, while two equivalents of iodine is eliminated, and in the latter case only SbI_3.

When the quantity of dissolved antimonic acid is not very small, a violet vapour is given off when the liquid is boiled. But even when the quantity to be detected is not more than a few hundredth parts of a milligramme, by shaking the dilute liquid with a few drops of bisulphide of carbon, the colour of iodine becomes recognizable.

For the purpose of distinguishing between antimonic acid and antimoniate of antimony, the reaction of nitrate of silver and ammonia with oxide of antimony may be taken advantage of. The oxide of silver is reduced to black suboxide by oxide of antimony, free or combined with antimonic acid ; so that when the substance to be tested is rubbed with some water, and a drop of the milky liquid is left to dry on a porcelain plate, a dark-coloured spot is produced when a solution of the silver salt is poured over it and gently warmed. The spots obtained by means of Marsh's test may be tested in the same way. By covering antimonial spots on a porcelain basin with nitric acid (1.42), and warming until the acid has evaporated off without boiling, the residue will consist chiefly of oxide of antimony, which, when moistened

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* *Comptes Rendus*, xlvi., 857.
† Specification, No. 413, 1858.
‡ Specification, No. 461, 1858.
§ *Annalen der Chemie und Pharmacie*, cvi., 1.

with nitrate of silver and ammonia, becomes black. Arsenical spots, on the contrary, give under the same circumstances the yellow or brownish-red precipitates, characteristic of arsenious and arsenic acid.

Quantitative Separation.—With regard to the estimation of antimony, it is most advantageous to weigh the antimoniate of antimony, because this substance is not volatile, or decomposed by ignition in contact with air. Since antimony is almost always separated as sulphide in analyses, it is necessary to have some speedy and easy means of converting that substance into antimoniate of antimony. By the use of nitric acid (1.42) for this purpose very inaccurate results are obtained, because the oxide of antimony cannot by this means be converted into antimonic acid sufficiently to prevent volatilization of sulphate of antimony. Moreover, the boiling point of the acid being nearly ten degrees above the melting-point of sulphur, the oxidation of this substance is very difficult. But when fuming nitric acid is used, these difficulties are avoided.

By covering the sulphide of antimony with eight or ten times its weight of this acid, in a weighed platinum crucible with a concave lid, the sulphur is readily oxidized when the acid is evaporated in a water-bath. The white residue, consisting of antimonic and sulphuric acids, may be converted by ignition into pure antimoniate of antimony without loss.

When the precipitate to be oxidized contains any large excess of sulphur it should be washed with bisulphide of carbon previously. Since the precipitated sulphide of antimony might take fire when the concentrated acid is added to it, a few drops of the weaker acid should be added at first.

The simple ignition of the sulphide with oxide of mercury is perhaps more convenient than the oxidation by nitric acid. When the oxide of mercury amounts to thirty or fifty times as much as the sulphide, the combustion takes place without explosion or any risk of loss. The mixture is heated in an open porcelain crucible, and the temperature lowered as soon as a sudden evolution of grey mercury vapour takes place. When this has ceased the temperature may be again raised, care being taken that no reducing flame comes in contact with the contents of the crucible. The last trace of mercury is retained with great tenacity by the antimoniate of antimony, which must be ignited until it ceases to lose weight. The volatilization of oxide of mercury in a porcelain crucible takes place so slowly that it is preferable to use a platinum crucible lined with oxide of mercury, so as to protect it from the action of the sulphide. When the sulphide is mixed with sulphur, it must be washed beforehand with bisulphide of carbon.

The following experiments were made for the purpose of testing the accuracy of the method:—

	Pure Antimony.		Antimoniate of Antimony.
1.	43.59		54.87
2.	50.28	gave	63.76
3.	30.72		38.88

Adopting the equivalent of antimony determined by Dr. Dexter, the quantities of antimony found would be:—

1.	43.49
2.	50.54
3.	30.82

The analysis of native sulphide of antimony gave:—

	I.		II.		Calculated.
Antimony	71.79	.....	71.56	.....	71.82
Sulphur	28.21	.....	28.52	.....	28.18
	100.00		100.08		100.00

For the separation of antimony from arsenic, the reactions of the sulphides of these metals with acid sulphite of potash may be taken advantage of. When freshly precipitated sulphide of arsenic is digested with a solution of sulphurous acid and this salt, it is dissolved. When the liquid is heated to the boiling point, it becomes turbid from the separation of sulphur, which again disappears when the liquid is boiled for a long time. It then contains, after the sulphurous acid is driven off, arsenous and dithionic acids. This reaction may be, in the main, represented by the equation—

$$2\,AsS_3 + 8\,KO\,2\,SO_2 = KO,\,AsO_3 + KO,\,S_2O_3 + 3\,S + 7\,SO_2$$

The sulphides of antimony and tin do not present this reaction, consequently they may be easily separated from sulphide of arsenic by adding to their solution in sulphide of ammonium a large excess of a solution of sulphurous acid in water, digesting the mixture for a while in the water-bath, and then boiling until the sulphurous acid is expelled, and about two-thirds of the liquid has evaporated. The residue of sulphide of antimony is quite free from arsenic, and the filtrate contains the whole of the arsenic as arsenious acid which may be precipitated by sulphuretted hydrogen.

A sample of commercial antimony was examined by this method for the purpose of testing its applicability; 0.2315 grm. of the powdered metal was dissolved in sulphide of potassium. The liquid was filtered into a flask of one litre capacity, mixed with a solution of sulphurous acid, and when evaporated to one-third its volume, gave a precipitate of sulphide of antimony, which was collected upon a filter, after twenty-four hours, washed, dried, treated with bisulphide of carbon and weighed. It amounted to 0.3502 grm., and 0.1059 grm. of this precipitate mixed with 15.27 grm. of oxide of mercury and ignited, gave 0.1440 $Sb_2 O_8$, and since the oxide of mercury left $\frac{45}{100,000}$ of fixed residue, this corresponded to 0.1372 grm. of pure antimoniate of antimony.

The filtrate from the sulphide of antimony was saturated with sulphuretted hydrogen, and the precipitate obtained, gave when oxidized and treated with ammoniacal solution of chloride of magnesium and ammonium, 0.0055 grms. of arseniate of magnesia and ammonia. When so small a quantity of sulphide of arsenic is to be oxidized, and it is mixed with a large proportion of sulphur, it is quite inadmissible to use chlorate of potash, and hydrochloric acid, or nitric acid (1.42). In the former case there is a loss from volatilization, of chloride of arsenic, and in the latter case the temperature rises above 112° C., and the sulphur being melted, may envelop particles of the sulphide, and render them inaccessible by the acid. Consequently, it is much better to use fuming nitric acid for oxidizing the precipitate, together with the filter, after it has been thoroughly dried. This is the quickest way of oxidizing the sulphide, and it has the further advantage in this case, that when small particles of sulphide of antimony have been carried through the filter, it is converted into antimonic acid, which may be estimated afterwards.

The clear nitric acid solution is slightly warmed and mixed with chlorate of potash in order to oxidize the substances resulting from the paper.

The precipitate of basic sulphides obtained in the first instance was burned, and the residue found to consist of—

Oxide of copper	0.0011 grm.
Peroxide of iron	0.0009 "
Sulphate of lead	0.0005 "

consequently, the antimony contained

Antimony	99.172
Arsenic	0.938
Copper	0.004
Iron	0.003
Lead	0.002
	100.119

In the analysis of a mixture of arsenious acid and the native sulphide of antimony above mentioned, the following results were obtained :—

	Taken.	Found.
Sulphide of antimony	42.16	41.84
Arsenious acid	57.84	57.74
	100.00	99.58

The bisulphide of tin is not dissolved by long boiling with solution of bisulphite of potash and sulphurous acid, and therefore it may be separated from arsenic in the same way as antimony. The operation is conducted in the same manner, but in washing the sulphide of tin, especial precautions must be taken. When pure water is used, the precipitate passes through the filter, so that a concentrated solution of chloride of sodium must be used for washing the precipitate until all the arsenic is removed, and then the adhering chloride of sodium is removed by a solution of acetate of ammonia containing a slight excess of acetic acid. If acetate of ammoniawere

used in the first instance, the arsenic could not be entirely precipitated by sulphuretted hydrogen, because this salt is partially decomposed by it into free acetic acid and sulphide of ammonium, which dissolves some of the sulphide of arsenic.

The precipitate of sulphide of tin is dried, converted into stannic acid by ignition in the air, and the residue weighed.

In order to test this method, a mixture of 0.1981 grm. arsenious acid, and 0.8710 grm. tin foil was digested with caustic potash and sulphur in a platinum crucible at 100° C. until the tin was dissolved, and only a residue of sulphide of lead remained. This residue was separated, treated with nitric and sulphuric acids, and gave 0.0030 grm. sulphate of lead. By treating the filtrate with sulphurous acid, &c., 0.2356 grm. stannic acid, and 0.3774 grm. arseniate of magnesia and ammonia were obtained. These results gave :—

	Taken.	Found.
Arsenious acid	51.43	51.26
Tin	48.05	48.22
Lead.....	0.52	0.52
	100.00	100.00

Production of Potassium by Electrolysis.—Hr. Linnemann* finds that cyanide of potassium may be decomposed by electrolysis more easily than any other compound of potassium. In the melted state it requires a Bunsen's battery of three plates or cylinders, of about two square feet surface. The electrodes are made of carbon, the + pole was in the shape of a plate, and the — pole was a conical piece of gas carbon with a sharp point, and the upper end, where it was connected with the battery wire, was thickly coated with copper by electro-deposition. A perforated brass knob, with a binding screw, was soldered to this copper with as little tin as possible, and the knob was then thickly coated with copper, so that even when intensely heated it adhered firmly to the carbon. The negative wire of the battery was passed through the hole in the knob. The plate-shaped piece of carbon was then immersed in the melted cyanide, heated so that it solidified at the surface, and then the pointed — pole was inserted. Potassium immediately collected under the crust of cyanide, which served to prevent combustion. Platinum could not be used for the electrode, because it was dissolved, and platino-cyanide of potassium produced.

Trehalose, a new Variety of Sugar.—M. Berthelot† has obtained this substance from Turkish manna. It crystallizes in rhombic prisms that are quite different from those of cane sugar, and have three times the rotary power. It is not acted upon by potash or baryta at 212° F., does not reduce alcoholic solution of tartrate of potash, and gives a precipitate with ammoniacal acetate of lead. This sugar does not readily ferment with yeast.

Treatment of Native Platinum, so as to obtain Alloys.—A patent has been obtained by Mr. Newton for a communicated invention relating to the working of native platinum. It is stated that platinum, when alloyed with the metals palladium, rhodium, and iridium, possesses characters which render it better applicable to a variety of purposes.

To produce these alloys, the native platinum, in a finely divided state, is mixed with lime and roasted in contact with air, until the greater part of the osmium is separated. It is then melted in crucibles lined with lime, in a muffle or reverberatory furnace heated by gas.

The residue from the treatment of native platinum with nitro-hydrochloric acid, consisting chiefly of osmide of iridium, together with chrome iron ore, quartz, &c., is to be melted either alone or mixed with lime, in crucibles lined with lime, so as to drive off the osmium and obtain a button of the iridium, rhodium, &c. The impurities, iron, chromium, &c., are oxidized and absorbed by the lime.

This residue may also be deprived of osmium before this treatment, by melting it with zinc, treating the powdered mass with hydrochloric acid, and roasting the residue—consisting of zinc, iridium, osmium, &c.—in a muffle until it has lost the whole of the osmium. The roasted mass is then melted with litharge and lead, the

* *Journal für Prakt. Chemie*, lxxiii., 415.
† *Gaz. Méd. de Paris*, 1857, No. 49.

regulus cupelled and melted in a crucible lined with lime. The metal thus obtained may then be mixed with platinum in the desired proportion.

Oxidizing Influence of Permanganate of Potash.—M. Péan* finds that two circumstances are necessary in many instances to produce oxidation by means of permanganate of potash, viz.: 1st, that the reagent must be used in excess; and 2nd, that the solution to which it is applied must be either acid or alkaline.

By attending to these requirements he succeeded in oxidizing completely and instantaneously, even at the ordinary temperature, hyposulphites, sulphites, and sulphides, and in converting iodine and iodides into iodates, nitrites into nitrates, and arsenites into arsenates. These substances could be readily estimated by Margueritte's method. The test liquids he used are—

1. A solution containing about 25 grammes of permanganate in two litres of water.
2. A solution containing about 100 grammes of protosulphate of iron and 100 grammes of concentrated sulphuric acid in the litre.

The solution to be tested is mixed with an acid or with an alkaline carbonate, according to circumstances, and then such an excess of permanganate solution is added that the liquid becomes deep red coloured. If the solution was alkaline it is then to be made acid, a known volume of the iron solution added, and the quantity of protoxide of iron left, estimated with the permanganate. The result is found by reading off the whole amount of permanganate solution used, and deducting from it a quantity equivalent to the volume of iron solution added.

Sulphides and hyposulphites are not entirely converted into sulphates by permanganate of potash, in the presence of an excess of acid; a mixture of sulphate and hyposulphate is produced nearly in the ratio of 4 : 1. When the solution is alkaline, both sulphites and hyposulphites are converted into sulphates.

Hyposulphuric acid.—The baryta and soda salts of commerce generally contain traces of sulphites or hyposulphites, which decolourize the permanganate solution. When an excess of the permanganate is added to the solution of these salts, hyposulphuric acid is produced, which is not affected by the permanganate.

Sulphuretted hydrogen.—In the presence of alkaline carbonate, the soluble sulphides, and most of the insoluble sulphides, are oxidized and converted into sulphates. Sometimes a minute quantity of sulphur escapes oxidation, probably owing to the production of sulphide of manganese.

Iodine and hydriodic acid are converted into iodic acid in acid solutions, but more readily in alkaline solutions. The presence of chlorides and bromides is not of any account, because they do not react with the permanganate.

Hydrocyanic acid does not react with permanganate solution; but when mixed with an excess of alkali, it absorbs from two to four equivalents of oxygen.

Arsenious acid may be oxidized either in alkaline or acid solutions.

M. Péan recommends expressing the value of permanganate solution in volumetric analysis, by the quantity of oxygen it is capable of yielding, in preference to the quantity of iron it is capable of oxidizing.

ON THE EQUIVALENTS OF THE SIMPLE BODIES.

BY M. DUMAS.

(*Continued from page* 190.)

FOURTH QUESTION.—*Do the numbers which represent the equivalents of the simple bodies, properly so called, and belonging to the same natural family, present, in their production, some laws analogous to those which are discovered in the production of the numbers representing the equivalents of the organic radicals of the same natural series?*

There exist several series of organic radicals whose equivalents are perfectly known, and whose mode of production is unequivocal.

1. Let us first consider the radicals of the ethers, methylium, ethylium, propylium, butylium, &c.

$C_2 H_3$
$C_4 H_5$
$C_6 H_7$
$C_8 H_9$ ..... $C^n H^{n+1}$

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* *Comptes Rendus*, March, 1858.

The equivalents of these several bodies are represented by—

$C_2 H_3$	15	$C_{22} H_{23}$	155
$C_4 H_5$	29	$C_{24} H_{25}$	169
$C_6 H_7$	43	$C_{26} H_{27}$	183
$C_8 H_9$	57	$C_{28} H_{29}$	197
$C_{10} H_{11}$	71	$C_{30} H_{31}$	211
$C_{12} H_{13}$	85	$C_{32} H_{33}$	225
$C_{14} H_{15}$	99	$C_{34} H_{35}$	239
$C_{16} H_{17}$	113	$C_{36} H_{37}$	253
$C_{18} H_{19}$	127	$C_{38} H_{39}$	269
$C_{20} H_{21}$	141	$C_{40} H_{41}$	281, &c.

The equivalent of the first of these bodies is equal to 15, that of the second to 29, that of the third to 43, and so on; by adding always 14 to that which precedes we form the equivalent of that which follows. There is then a common starting point, and a constant difference between all the terms of this series, which amounts to saying that it represents an ascending progression, with a difference the amount of which is 14, and the first term of which is 15. The formula $a+n\,d$, therefore, represents the generation of all these radicals, a being the equivalent of the first of them, and d the difference which exists between the weight of this equivalent and that of the second.

We remark between the equivalents of several of these bodies relations worthy of attention. If we did not know by the incontestable mode of generation of these different radicals that there cannot exist any simple relation between the numbers which represent them—if, in a word, it was a question of simple bodies distinct from each other, and not of compounds the well-known formulæ of which admit of no illusion—would it not be thought that equivalents represented by

141 and 281
127 " 253
113 " 225
99 " 197

present the simple ratio of 1 to 2? As this is not the case, it may be concluded that we may meet with other cases where the ratios appear simple, but in reality are complex. It may also be remarked, that if it had to be decided whether the equivalent of an undecomposed body, for example, was 225 or 226, the problem would be almost always beyond the means at the disposal of chemistry. In order to be certain of the result, the question should relate to a compound having a well-authenticated formula, produced by elements whose equivalents have been determined with great accuracy, and even by elements whose equivalents are small, but united in great numbers.

As caprylium, which is represented by 113, and cetylium, which is represented by 225, are not in the relation of 1 to 2, although all their compounds are connected by the closest relationship, and they form parts of the most natural family, why should we be astonished that molybdenum and tungsten are similarly circumstanced?

From the mode of formation of all the radicals of the series referred to, it is evident, moreover, that any three of its contiguous terms will always possess this property, that the middle term will have as its equivalent the mean of the equivalents of the two extremes. It might therefore be divided into numerous triads, for the series is continuous, and comprehends no less than twenty species.

It is not even necessary that the three terms should be contiguous; it is sufficient that the mean of their hydrogens should be an uneven number, or that of their carbons an even number. The equivalent represented by this mean always coincides with that of one of the radicals of the series. Thus,

$$C_{38} H_{39} + C_2 H_3 = 2\, C_{20} H_{21}$$

Thus also,

$$C_{40} H_{41} + C_4 H_5 = 2\, C_{22} H_{23}, \text{ &c.}$$

In a triad of mineral chemistry we may therefore meet with quite as many bodies very near, or separated by numerous intermediate bodies, and consequently widely separated from each other by their properties.

2. The formula deduced from the foregoing simple progression would not account for the generation of the elementary bodies of mineral chemistry, as Mr. Cooke supposed. But the organic radicals are not always formed by addition, as in the

preceding case; they are also produced by substitution, as is seen in the compound ammoniums.

A second radical, ammonium, NH_4, gives rise, in fact, to a great number of compound ammoniums, in which 1, 2, 3, 4 equivalents of hydrogen may be replaced by 1, 2, 3, 4 equivalents of methylium, ethylium, propylium, &c., each of these carburets of hydrogen being capable of intervening for one or more molecules, provided that the sum of them does not exceed 4.

However, if we consider the numerical results produced by these substitutions, we see that they are represented exactly as if we had added to NH_4 quantities equal to 1, 2, 3, 4 times $C^n H^n$.

We should therefore have as the formula of the compound ammoniums produced by these carburets of hydrogen d with ammonium a, the general formula:—

$$a + n\,d,\ d',\ d'',\ d'''\text{, \&c.},$$

n being a whole number equal to 4 or less, and d, d', d'', d''', the weights of the respective equivalents of each of the carburets of hydrogen of the series $C^n H^n$.

Taking a few examples, we might have the following ammoniums :—

a	$a + d$	$a + 2d$	$a + 3d$	$a + 4d$
	$a + d'$	$a + d + d'$	$a + 2d + d$	$a + 3d + d'$
		$a + 2d'$	$a + d + 2d'$	$a + 2d + 2d'$
			$a + 3d$	$a + d + 3d'$

and even

$$a + d + d' + d'' + d'''$$

It is not useless to the subject under examination to add, that if we apply to the formation of these compound ammoniums, discovered by M. Wurtz, the algebraic formula of combinations, we may predict with certainty, as I have shown, the existence of at least two hundred thousand radicals of this kind.

3. In the two foregoing examples, the first body of the progression—that is to say, methylium or ammonium—which we have represented by a, does not change. It is found in all the successive compounds with the coefficient 1.

But there are other compound radicals of organic chemistry in which it is seen at once that the bodies change which are added, or which are substituted around the fundamental radical, which serves as the first term in the progression, and even this molecule itself.

Thus, tin and ethylium give rise to six molecular groupings, all possessing qualities characteristic of these compound radicals of organic chemistry, which behave strictly in the manner of metals. Now, if we represent tin by a, and ethylium by d', we arrive at the following formulæ for the six species of stanethyliums known:—

$a + d'$	$2a + d'$	$4a + d'$
	$2a + 3d'$	$4a + 3d'$
		$4a + 5d'$

In conclusion, the series of radicals of the ethers is represented by the formula

$$a + n\,d$$

n not having a known limit, and d being invariable.

The series of ammoniums is represented by the formula

$$a + n\left\{\begin{matrix} d \\ d' \\ d'' \\ d'''\text{, \&c.}\end{matrix}\right\}$$

n being equal to 4, 3, 2, or 1, and d, d', d'', d''', &c., being distinct numbers, often multiples of each other.

The series of stanethyliums is represented by

$$n\,a + n\,d',$$

in which the numbers a and d may each be repeated a certain number of times, and in which the replacement of ethylium by some other of the radicals of the ethers admits of our replacing the quantity d' by its equivalents d, d'', d''', &c.

(To be continued.)

ON THE STRIÆ SEEN IN THE ELECTRICAL DISCHARGE *IN VACUO*.

BY W. R. GROVE, V.P.R.S., &c.

In a paper communicated to the Royal Society in January, 1852, I published the first notice of transverse bands or striæ which are seen in the discharge from a Ruhmkorff coil in the vacuum of an air-pump, wherein is placed a piece of phosphorus; and in a postscript to that paper (*Phil. Mag.*, vol. iv.), I stated that the striæ could be seen in several attenuated gases, probably in all. Some time after the publication of my paper, but without having seen it, M. Ruhmkorff observed the same phænomenon in the vapour of alcohol; and it has subsequently been experimented on by Messrs. Masson, Quet, Du Moncel, Robinson, and Gassiot, the last of whom has elaborately examined it in the Torricellian vacuum.

No satisfactory rationale of the phenomenon has been given. In my first paper I gave no opinion as to its cause; but subsequently, in a communication to the British Association at Hull, I stated my belief that it was closely connected with the interruptions of the contact breaker. The following is the notice of my communication in the *Athenæum*, August 30, 1856:—"Mr. Grove has observed that the mode of breaking contact has a marked influence on the phenomenon. If, for instance, the arm of the contact breaker be made to rest on a slight spring placed underneath it, the bands become narrower. If a single breach of contact be effected, most observers have remarked that the effect is still perceptible: but it is very difficult to effect a single breach of contact; the fusion of the metals at the point of contact with the vibration accompanying the movement, occasions a double or triple disruption. The best mode is to place two stout copper wires across each other, and with a firm hand draw one over the other until the end of the former parts company with the latter; when this is well done, the striæ are, in the majority of cases, not observed. Of all the substances which have been tried, the vapour of phosphorus succeeds best; and with this is seen a remarkable effect on the powder or smoke of allotropic phosphorus (which is always formed when the striæ are observed): this smoke traverses from pole to pole from the negative to the positive side, showing, unless there be some latent optical deception, a mechanical effect of the discharge under the circumstances."

Dr. Robinson, who has a little misunderstood my meaning in this passage, says (*Proc. Royal Irish Acad.*, December, 1856), "Mr. Grove appears to think it arises from some vibration in the metal of a contact breaker, which produces a fluctuation in the inducing current." I did not mean to say that the effect was due to any peculiar vibration of the metal of the contact breaker, but to the interrupted and successive discharges of the apparatus itself,—that the changes in the character of the discharge attendant upon changes in the action of the contact breaker, as well as the frequent absence of striæ when only a single disruption was effected, afforded evidence that the striæ were connected with the multiplied discharges. My notice was, however, short and somewhat obscure, as, although I entered fully on the matter in the Section-room, I had prepared no memoir on the subject. I still retain the opinion I then expressed, though I do not assert it as a positive conviction; the difficulty of proving it arose from the circumstance that it was next to impossible to produce, by the ordinary modes, a single discharge from the induced coil, for the following reasons:—When one extremity of the wire of the primary coil is drawn over the other, an induced current is produced at the moment of disruption in the secondary wire and a consequent discharge in the vacuum. But at this same moment of disruption, the extra or induced current in the primary wire itself finds a passage in the form of a spark immediately the contact is broken, and this extra current occasions necessarily a second induced current in the secondary wire, which having a ready path opened to it by the discharge of the previous current, would be discharged through that path, though it might not have tension enough to overcome any great resistance. Although, therefore, these discharges cannot be separated to the eye, it by no means follows that there are not two discharges when an apparently single disruption of the primary circuit takes place.

I had repeatedly and in vain attempted to get rid of this difficulty, and to produce what I could feel assured was a single induced discharge, when a very simple plan occurred to me, which I am surprised did not more readily present itself: it is simply to make an interruption in the secondary circuit, besides that formed by the

vacuum; such second interruption to be in air, and of the extreme length of the spark, so that not more than one spark should pass at a time across the intervening air, and consequently not more than one discharge through the vacuous space.

Using the air-pump with phosphorus and a stick of potash in the receiver, I connected by a wire one of the secondary terminals of a Ruhmkorff coil with the rod which entered the receiver at the top. The wire from the second terminal was attached to a glass stand or pillar, so that its end projected; to another glass stand was attached a wire with one end also projecting, and the other end was fixed to the brass work of the air-pump. The two projecting ends could be made to touch, or to remain at any desired distance from each other.

The ends of the wires being in contact, the coil apparatus was set at work, and the striæ very beautifully exhibited in the receiver; the projecting wires were now gradually separated, and the striæ for some time continued visible, and until the points of the wires were so far apart that an occasional spark only passed from point to point when the striæ disappeared, and a uniform luminous cloud was produced in the receiver. Even in this extreme case, however, there is apt to be a double discharge, which any one who has not watched closely the phenomenon with eye and ear, would not detect, but would pronounce the discharge to be single.

From unavoidable minute differences in the action of the contact breaker, discharges will, all conditions being apparently the same, vary in strength and length; those accustomed to the apparatus will know that, by separating the terminals beyond the normal distance of the discharge, sparks will still pass at occasional, distant, and irregular intervals, proving the slightly varying intensity of the apparatus.

Now, when the points are separated to the maximum for the experiment which I have detailed above, two classes of sparks will be perceived in the air: the one a thin blue spark, giving to the ear a single sharp sound; and the other a burred yellow spark, with a sound not so clear and metallic, but attended with a slight whiz. This contrast of sound may be roughly compared to that presented by a whole or cracked piece of porcelain when struck. It requires attention and habit to distinguish these two classes; but when the power is attained, it will be seen that with the first or single discharge there are no striæ in the receiver. With the second, which I believe to be a double discharge, striæ are visible.

By careful adjustment I have been able to obtain sparks of the former class only, and then the experiment may be continued indefinitely with no striæ visible; but on the slightest alteration in the distance the striæ appear. It is, however, more frequently the case, that, notwithstanding all the care used, sparks of both characters will pass in irregular succession; and then the discharges will be without striæ in some cases, and with them in others.

It is necessary to mention the above distinctions, as otherwise any person repeating the experiments might be deceived, and not succeeding in obtaining discharges without striæ, though the discharges were apparently single, would imagine the results I have described to be illusions arising from an error of vision.

I repeated the above experiments in one of Mr. Gassiot's vacuum-tubes, which showed the striæ beautifully under ordinary circumstances; but when the division in the circuit was carefully made and carried to its fullest extent, the discharges passed without any striæ, the tube being filled at each discharge with a uniform glow.

From the above experiments I am satisfied that in attenuated media, wherein the striæ are well seen when the ordinary interrupted currents are used, discharges may be made to pass which exhibit no striæ, and under such circumstances that there is every reason to believe single discharges only pass. Join to this the fact that the appearances of the striæ vary with any variation of the contact breaker, that the striæ are more numerous and narrower in proportion as the intermissions of the contact breaker are more rapid, which I have observed to be very notably the case, the evidence seems strong, if not conclusive, that the striæ or bands are due to the mechanical interference or reciprocal impulsions of two or more discharges, or rather of the medium affected by them.

I will take this opportunity of mentioning one experiment which I believe to be new and not devoid of interest. M. Plücker and Mr. Gassiot have published several interesting experiments on the effects produced by magnets on the striæ or on the electric discharge in highly attenuated media commonly called vacua.

In repeating some of these experiments with a vacuum-tube kindly given me by Mr. Gassiot, 2 feet 9 inches long between the platinum wires, and 1 inch internal diameter, I found that when the pole of a powerful bar magnet was brought close to the positive platinum in a certain direction, the visible discharges only passed occasionally and at intervals through the tube, notwithstanding the apparatus went on working, and the contact breaker vibrating as usual. After many experiments, I found that I could stop the discharge entirely by placing the poles of two magnets opposite each other, and in a particular direction with reference to the line of discharge. The two platinum wires in this tube are inserted perpendicularly to the axis, and penetrate half an inch into the tube. If, now, the tube be placed horizontally, the platinum wires uppermost and the observer looking along the tube from the positive to the negative wire, the north pole of a magnet should be placed on the right-hand side, and as nearly as can be to the platinum, *i. e.*, touching, or nearly so, the glass tube, while the south pole of another magnet is similarly placed on the opposite or left-handed side. The discharges cease entirely, and there is no conduction through the tube, showing that it is not a case of dark discharge, but an arresting of the passage of the discharge through the attenuated medium. If the tube be turned one-fourth round its axis in either direction, the discharges reappear, as they also do if the magnets be reversed. The experiment requires care, and it seems to be necessary to make it with a power of coil just sufficient to enable the discharge to traverse the distance between the platinum terminals and with a certain magnetic power: if made with a powerful electro-magnet, the discharge is stopped, whichever side the poles be placed with reference to the platinum wires, but the discharge is only made intermittent when the platinum wires are placed in a line joining the poles of the magnet. In the above-mentioned tube, the portion of one end of the glass around one of the platinum wires was covered with a dark deposit of platinum, from the terminal at this end having been constantly used as the negative pole; when this was made positive instead of the clean end, the effect of arresting the current could not be produced: this circumstance, and the delicacy of the conditions necessary to ensure success in this experiment, lead me to think that the stoppage of the discharge is due to the diversion in direction of the electric line of force produced by the magnet; the discharge is, so to speak, blown out by the magnet: but I hesitate to express a positive opinion on this point.

When magnets are made to approach the negative platinum, there is no stoppage of the discharge, but attractions and repulsions are observed on the blue flame, which have been described by Mr. Gassiot, and which I need not therefore repeat.

I tried the effect of magnets on the spark from Ruhmkorff's coil in air, but could not arrest them, though they appeared to pass with somewhat greater difficulty and longer intermissions; the difference was, however, very slight.—*Philosophical Magazine.*

PHOTOGRAPHY IN THE NATURAL COLOURS.

At a meeting of the French Photographic Society, on the 18th ult., M. Edmond Becquerel set forth and demonstrated experimentally the processes by means of which he has obtained the production of colours by the direct action of light. The problem requiring solution (as we* were the first to state clearly in the History of Photography, which forms part of the second volume of our "Repertory of Modern Optics") was the discovery of a kind of artificial retina,—a substance which the red rays would colour red, the yellow rays yellow, the blue rays blue, &c., &c. We had scarcely said that it would be rash to affirm that the natural colours of the spectrum could not be reproduced upon a photogenic surface, when M. Edmond Becquerel, at the memorable sitting of the Académie des Sciences of the 31st January, 1848, announced a solution, if not perfect, at least real, and grandly sketched, of this fine problem. The tints of his photographic spectrum imitated, or, better, reproduced, though imperfectly, the prismatic colours. The learned physicist could not succeed in fixing his photochromatic images, diffused light causing them to disappear; discouraged by this, he has since added nothing to his discovery during the last nine years.

The processes and results which he set forth on the day above mentioned, are the

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* *Revue Photographique.*

same with those of 1848; but as the *Revue* did not exist then, we will give an analysis of the more important of them. The object which has the power of rendering each colour which falls upon it, with a tint, if not identical, at all events analogous, is a plate of silver, the surface of which is chloruretted in the following manner: the plate, polished with English rouge and tripoli, is fixed by a little supporter formed by two copper wires in the form of a fork; the two wires are united at their superior extremities, and are connected with the positive pole of a Bunsen's galvanic battery of two elements; the plate is plunged into a large vessel containing from ten to twelve pints of dilute hydrochloric acid (125 cubic centimetres of the acid of commerce, with a litre of water). A narrow strip of platina is then plunged into the same vessel, connected with the negative pole of the battery; the extremity of the strip of platina must be moved rapidly at a certain distance from the plate, and parallel with its surface; the chlorine liberated by the current attacks the plate, and it may be seen to take successively a grey colour, then to change to a yellowish tint, then violet, then to a bluish and greenish tint, bluish grey, violet again, and finally blue. Just sufficient light should be admitted into the room where the operation is going on to enable its successive modifications to be observed; the operation must be arrested before the appearance of the second blue tint, when it is lilac, which ought to be the case after one or two minutes, if the operation is well conducted; the plate is then removed quickly from the bath, and plunged into distilled water; it should then be dried by warming it with a spirit-lamp while in a slightly inclined position, care being taken to blow gently on the surface while the drying is going on. Thus prepared, and preserved from the light, the plate may be kept for an indefinite period without undergoing any alteration; under the influence of diffused light it acquires a greyish tint. Before using it, it is well to rub it with a pad of cotton. If a very pure and strongly concentrated solar spectrum be projected upon its surface, the orange and red rays are the first to imprint their images, but the image of the red deepens rapidly, and passes into a black; the green appears next, then the violet; the yellow and orange colours present themselves with difficulty; a sensible action manifests itself on this side of the red, and on the other side of the violet; the coating is therefore impressionable by rays more or less refrangible than those perceptible to the organs of vision.

The image obtained as a definite result does certainly resemble in its tints the colours of the spectrum which created them, although they are generally deeper and more sombre. It is only at the first instant that they appear true and fresh. If a white light had been used, the image obtained would have been grey. But the plate might be submitted to such a modification that the white light should imprint itself in white, and sometimes in a very pure white. It suffices for that to anneal it, or to heat it in a drying stove to 100° C. before exposing it to the light. Under the influence of the heat it becomes of a deeper and deeper rose colour, and passes to a light rosewood hue; it is time then to stop: if it has been heated too much, the chloride will have finished by coalescing with the annealed plate. The rays of the spectrum, like the white light, will paint themselves in their proper colours, vivid and brilliant, not blackening more when the exposure is prolonged. The yellow and the green are very clear; the blue and the violet vivid and well contrasted; the orange and red intense, but mixed with a little violet. The portion on this side of the red, represented by an amaranth band upon the unannealed plate, is scarcely sensible upon the annealed plate, but the rays on the other side of the violet continue to exercise a pretty energetic action. The photographic spectrum obtained upon the chloruretted and annealed plate presents, therefore, a complete resemblance to the solar spectrum in all its visible portions, and is continued beyond the violet by a greyish-black tint. By placing upon the passage of the solar pencil a thin screen formed of a very feeble solution of acid sulphate of quinine, the more refrangible rays than the violet may be arrested without arresting the visible ray: the photographic spectrum will then have the same extent as the visible spectrum, and the chloruretted and annealed plate will be exactly comparable to the human retina; the maximum intensity corresponds also to the yellow.

The time of the exposure varies with the intensity of the spectrum: if it is very concentrated or only slightly dispersed, a few minutes suffice to obtain a beautifully coloured image; if it is produced by a very narrow cleft, and if it be much dilated, the exposure must be prolonged one or two hours; but then also the lines of Fraunhofer will be seen to depict themselves in black. If the spectrum is produced by

light which has traversed transparent coloured media, the sensitive material remains unaltered in the parts corresponding to the obscure bands.

So long ago as 1848 M. Becquerel had obtained images of coloured prints in the camera, but the colours were less vivid than those of the solar spectrum.

We have already said that all these chromatic images have the grave drawback, which it has hitherto been impossible to remedy, of changing under the influence of diffused light.

In justice to M. Nièpce de St. Victor, we must mention that he has for a long time pursued the experiments of M. Becquerel, and with somewhat more success, the object of which was to reproduce coloured images in the camera.—*Revue Photographique, in the Journal of the Photographic Society.*

CAUSTIC LINT.

Nitrate of Silver is never applied to sores, except in the solid state or in solution. In the former case its action is often too severe; in the latter it is sometimes too transient. M. Riboli has conceived the idea of dissolving nitrate of silver in a small quantity of water, soaking pledgets of lint in the solution, and drying them. This caustic lint, applied to ill-conditioned ulcers, produces a more permanent effect than the remedy in a liquid state; and as the author proposes different degrees of concentration for the solution, the activity of the treatment may be varied, according to the nature of the case, and the more or less advanced stage of the affection.—*Bulletin Général de Thérapeutique*, 30th April, 1858, p. 379, and *Dublin Hospital Gazette.*

COMPOUNDS OF IODIDE AND BROMIDE OF MERCURY WITH THE ALKALOIDS.

TO THE EDITOR OF THE PHARMACEUTCAL JOURNAL.

In the *Pharmaceutical Journal* for the current month (September), there is a paper upon the "Compounds of Iodide of Mercury with the Alkaloids," by Mr. T. B. Groves, F.C.S., extracted from the *Quarterly Journal of the Chemical Society.* The class of compounds under notice are formed upon adding a solution of the iodides of mercury and potassium to a solution of any of the alkaloids, and the author states his belief that this classof compounds has not hitherto been noticed. In this belief, however, he appears to be mistaken, as the following notices clearly show:—In Gmelin's *Handbook of Chemistry*, Cavendish Society's edition, vol. ii., p. 184, this remark occurs:—"With protiodide of mercury most or all alkaloids enter into combination; hence most of their salts, even very dilute, form with iodide of mercury and potassium, precipitates." Again, in the *Pharmaceutical Journal*, vol. xvii., p. 126, we read:—"The solution of iodide of mercury in iodide of potassium has *long been used as a test for the alkaloids.* They give with this reagent, even with very dilute solutions, a slightly coloured precipitate."

It is therefore obvious that the salts observed by Mr. Groves are not new, but, on the contrary, have been frequently noticed. This gentleman further states that he has not been able to produce a corresponding ammonia compound. Now, it is certainly a little singular, that the reaction between the volatile alkali and the iodides of mercury and potassium has been proposed by Dr. Nessler as an extremely delicate test for ammonia—a precipitate being formed, even in highly dilute solutions, in the presence of free potash. The method is described at length in your interesting monthly *résumé*, collated by Dr. Paul, in the *Pharmaceutical Journal*, vol. xvii., p. 126.

I am, Sir, your obedient Servant,

68, *Broad Street, Worcester, Sept.* 8, 1858. J. Dyson Perrins.

ELECTRICITY FOR PRODUCING INSENSIBILITY IN TOOTH DRAWING.

TO THE EDITOR OF THE LANCET.

SIR,—The application of galvanism in the extraction of teeth is likely to occupy much attention, and as this new agent for producing local anæsthesia can be employed *without danger*, a great boon will be secured to the world, should the invention, after standing the test of experience, realize the sanguine anticipations of the originator. This being the case, perhaps you will kindly allow me space to give the history of the introduction of the agent into this country. Some statements have been made upon the subject in lay journals, which, I think, should have been reserved for professional publications; however, as these statements have been but partial, I will proceed to narrate how the invention was introduced to the notice of the profession in this country.

The first public mention of galvanism as applied to tooth extraction is to be found in the last July number of the (London) *Quarterly Journal of Dental Science* (p. 254), wherein Dr. Berry, of Philadelphia (U.S.), writes that some few dentists had adopted the agent in America; and that a gentleman, a fellow-citizen, claimed to be the inventor, but that he was under an impression that this was a mistake, and that the method of operating had been practised in England.

The next that we hear about the process is in the *American Journal of Dental Science*, which reached England about a month ago. From this journal it would appear that great attention has been given to the matter in the United States. Dr. J. B. Francis claims to be the inventor, and has secured his rights as such by letters patent. A committee of the Franklin Institute of Pennsylvania had been appointed to investigate the value of the discovery. In the course of the report of this committee the following observations are made:—"One hundred and sixty-four teeth were extracted in the presence of the committee." "The committee is satisfied..... that in a large majority of cases of extraction with this apparatus, *no pain whatever* is felt by the patient." "To test whether the effect might not be merely mental, the current was broken without the patient being aware of it, when the usual pain was experienced, although, in the same patient and on the same occasion, teeth had been removed while the current was flowing without causing pain." "The operator requires no new instruments except the battery and coil."

In the specification of the patent, which is published at length in the American journal, the *modus operandi* is fully given; and it would appear that no time was lost in this country in profiting by the circumstance, testing the value of the process, and publishing the result. Candour to our transatlantic brethren, however, demands that the source from which the idea was produced should be made known, in addition to the mere announcement of the fact that galvanism has been successfully employed by individuals in this country.

I am, Sir, your obedient servant,

Sept. 1858. A MEMBER OF THE COLLEGE OF DENTISTS OF ENGLAND.

The following is a description of the apparatus, and its mode of application, by Mr. K. Bridgman, in a letter to the *Times*:—

The apparatus for the purpose is extremely simple, and consists principally of the common electro-magnetic machine used in medical electricity, a single cell and pair of plates constituting a Smee's battery, and a small electro-magnetic coil with a bundle of wires for graduating the strength of the current. One end of the thin wire conveying the secondary current is attached to the handle of the forceps, and the other end of it to a metallic handle to be placed in the hand of the patient. The instrument touching the tooth completes the circuit, and the current passes instantaneously.

The wire attached to the forceps should be made to pass through an interrupting footboard, so that the continuity of the wire may be made or broken in an instant by a movement of the right foot of the operator. The advantage of this arrangement is that it allows the instrument to be placed in the mouth without risk of producing a shock in coming in contact with the lips, cheeks, or the tongue, which would interfere with the quiet of the patient.

A hole drilled in the end of the left handle of the forceps and the end of the wire tapered to fit rather tightly allows the substitution of one pair of forceps for another with scarcely a moment's delay.

DEATHS FROM CHLOROFORM.

A YOUNG woman died at Epsom, on Friday, Aug. 27, under chloroform, at the house of Mr. Keeling, a dentist. The facts of the case are as follows:—The deceased, a remarkably tall, fine young woman of two-and-twenty, lived as a servant with Dr. Barrett, a physician, residing in the adjoining parish of Ewell. For some time past the deceased had suffered from toothache, and having witnessed the successful use of chloroform, administered by Mr. Keeling, she wished to avail herself of the same means. She consulted Dr. Barrett, and from that gentleman's personal knowledge of the state of uninterrupted health enjoyed by the deceased for the last seven years he, without the slightest hesitation or misgiving, wrote an authority for the extraction of the offending tooth with the aid of chloroform, not suspecting the slightest risk from its use. Deceased took this paper, and accompanied by her mistress, walked to Epsom, to the establishment of Mr. Keeling, who proceeded to operate as requested. It appears from the evidence at the inquest, that Mr. Keeling desired merely to deaden the nervous sensibility of his patient—not to produce unconsciousness. The quantity of chloroform administered was accordingly very small, but its effects were most unexpected and distressing. She inhaled the chloroform from the napkin held in her hand for a brief time, and, on being asked if she was ready, replied, "Not yet," again sniffed at the napkin, and then said, "Now." The tooth was almost instantaneously extracted, a slight movement of the jaw followed, when deceased appeared to faint, and, notwithstanding the use of powerful restoratives promptly and continually applied, she never rallied. Messengers were despatched for medical assistance, and to Dr. Barrett himself. This gentleman was fortunately going to Epsom, and was met by the messenger, who informed him of the danger of his servant. He hastened onward, and on arriving at Mr. Keeling's found life utterly extinct. Other assistance speedily arrived, but, of course, it was useless. The whole of the evidence went to show that no blame could or should attach either to the mode of the administration of the chloroform, or the promptness and fitness of the means taken to combat its distressing results, although, unhappily, unavailing. The jury found a verdict of "Accidental death," acquitted Mr. Keeling of the slightest blame, but desired to recommend the cautious use of chloroform in trifling operations in future. With reference to this expression of opinion on the part of the jury, Mr. Keeling desired to explain that he had in his evidence, at the request of the coroner, but with some hesitation, in deference to the medical men present, expressed an opinion that death in this instance was caused by the administering a *minimum* quantity of chloroform, the patient not possessing sufficient vital energy to recover from its effects. He did so with the intention that, wherever a report of this case might go, medical men and others may see that a *minimum* quantity of chloroform, administered with the greatest caution, may cause death, and, such being the case, it is desirable that its use in operations of a minor character may be avoided.

An inquest was held on the same day at the Red Lion, Heathencote, near Towcester, by Mr. A. Weston, deputy coroner, on the body of William Rush, aged 11 years, who some weeks previously had received an injury of the foot. He was attended by Mr. E. F. Watkins, surgeon, who, in order to make a satisfactory examination to ascertain the nature of the injury, administered chloroform. After six or eight inspirations, the desired condition appeared to be produced, and the pulse had indicated no disturbance of the circulation, when the patient made two short stertorous inspirations. The chloroform was immediately discontinued, but the pulse fell, and after a few hurried beats ceased altogether. A variety of means were resorted to, for the purpose of restoring animation, but without effect. The jury, after a short consultation, found "That the deceased came by his death from the effects of chloroform, administered by Mr. E. F. Watkins for the purpose of producing insensibility to pain." Mr. Watkins was of opinion that the use of a cotton handkerchief, of much stouter texture than silk or cambric, might possibly have been the cause of preventing the due admixture of atmospheric air.

POISONING BY BELLADONNA FRUIT.

ON Tuesday morning, September 14th, a little girl, 14 years of age, named Susannah Wells, who lived with her parents in Sussex-court, Richmond-hill, died suddenly. She had only been ailing since about 8 o'clock on Sunday evening, when she fell ill after partaking of some luscious-looking fruit, which had been gathered

for mulberries. It appears that on Sunday a party of lads, from the neighbourhood of Richmond-hill, Leeds, went out into the country to gather blackberries. They were attracted by a dark purple fruit, and asked a farmer what it was. He replied that it was the mulberry ; he told them that it was a very rich fruit, at the same time eating four of the berries himself. The children gathered about a couple of pints of this "fruit," which they brought home, and distributed the same evening over four families. By various members of these families were these berries taken. They were all taken violently ill the same evening. Not anticipating any serious effects from their sickness, they only employed simple emetics till early on Monday morning, when Mr. Seaton, surgeon, was called in. His inquiries and examination of the berry led him at once to find that they had all partaken of the fruit of the *atropa belladonna*, better known by its familiar name of the "deadly nightshade," and he applied the usual remedies for that narcotico-irritant poison. All the patients were then suffering from mania, dryness, and contraction of the throat, difficulty of breathing, great restlessness, and dilated pupils of the eyes, and some of the attacks of delirium were dangerous both to themselves and others. In despite of medical assistance, Susannah Wells gradually sank, and died on Tuesday morning. The other sufferers lie in a dangerous state. An inquest will be held on the body of the deceased ; but it is expected that an adjournment will have to take place, in order to see whether the illness of any of the other sufferers has a fatal result. Some of the persons thus poisoned had only eaten a couple of the berries, others had eaten as many as 14. Those who took the berries immediately after tea were not so violently affected as those who had taken them fasting, but all the cases presented the symptoms we have named, either in a greater or lesser degree.—*Manchester Guardian.*

ALLEGED POISONING BY THE BERRIES OF THE MOUNTAIN ASH.

On Monday, September 13th, an inquest was held at the Travellers' Inn, Armley, by Mr. Blackburn, borough coroner, upon the body of Joseph Murgatroyd, a child five years old, whose father is a clothier at Armley. The deceased had been ailing for the last fortnight, but on Friday afternoon he commenced vomiting dark matter, and continued to do so for some time. On the following morning Mr. Alfred Rickards, surgeon, was called in, and prescribed for the child, whom he supposed to be suffering from pleurisy and disease of the kidneys. The deceased, however, continued to suffer, and died at half-past eleven o'clock in the evening. On a *post-mortem* examination being made, the remains of mountain ash berries were discovered in the stomach of the deceased, who had no doubt eaten them when in the field. Mr. Rickards was clearly of opinion that the deceased had been poisoned by these mountain ash berries, and the jury returned a verdict accordingly.—*Leeds Mercury.*

That the berries of the mountain ash had not been the cause of death, we had a strong impression, which has been since confirmed by the following statement from Mr. Rickards, in a letter to the *Lancet* :—

"Up to the time of holding the inquest, I could not ascertain that the child had eaten any other berries than those of the mountain ash ; and finding some reddish-yellow pulp in the stomach, such as the berries of the mountain ash would produce, I believed (though contrary to the generally received opinion of this fruit) that death must have resulted from it. On further examination, however, I believe the child to have eaten two or three different kinds of berries, amongst which are those of the woody nightshade, and which I now believe to have been the cause of death."

POISONING BY ARSENIC.

An inquest, after two previous adjournments, was concluded, Friday, September 24, at Bristol, on the body of Charles Hill, a mason's labourer, aged twenty-three, who died from the effects of arsenic. From the evidence, it appeared that deceased was of intemperate and dissolute habits, and in the evening of September 13 visited several public-houses, at which he treated several girls of the town. He afterwards went to the house of Harriet Ritchins, a girl who was pregnant by him, and there fell asleep. On awaking he was seized with vomiting and pains in the stomach. Mr. Furze, a surgeon, was called in, and administered a powder, which, however, the deceased did not retain, and at half-past ten he died. From the evidence of Jane Hill, mother of the deceased, and of several other witnesses, there had been no ill-feeling manifested towards him by any one, and, until his death, they thought he was suffering from the effects of drink. Dr. W. B. Herapath deposed that he dis-

covered nothing to account for death by a simple *post-mortem* examination of the body, but on opening the stomach he found the mucous membrane highly inflamed. It contained three ounces of fluid, apparently tea, and some solid matter, both of which showed traces of arsenic when treated by Reinsch's process, and from the tissue of the stomach, undoubted evidence of a much larger quantity of arsenic was obtained; traces of arsenic were also found in the blood and tissue of the liver.

Dr. Herapath stated that he had carefully examined his tests, and was satisfied that they were free from arsenic, and that the symptoms described and the *post mortem* fully coincided with the idea that arsenic was the cause of death.

The jury, after consultation, were unanimous in finding that the deceased died from the effects of arsenic, but how or by whom administered, there was no evidence to show.

DEATH FROM STRYCHNIA.

An inquest has been held before Mr. William Baker, coroner, respecting the death of Lavinia Ann Francis, aged 16 years, daughter of Mr. W. L. Francis, a medical officer of Stepney Union, who died from strychnia. It appeared from the evidence that on the night of the 5th of September, deceased, who had been in good health and spirits, retired to rest with her younger sister, and both got up as usual in the morning at seven o'clock; shortly before eight deceased ran down into the kitchen, and told her sister that she had cramp pains. Her father and mother were called, and they sent for Mr. Olding and other medical gentlemen, who administered remedies, but she died in two hours. Mr. T. Orton, surgeon, stated that he found deceased in violent convulsions ; she was sensible during the intervals of the paroxysms, and frequently said "Keep me down." A *post-mortem* examination was made, and Dr. Letheby stated that he had analyzed the contents of the stomach ; it was perfectly healthy and contained two ounces of liquid, like tea, which on analysis exhibited strychnia, by which, doubtless, death was caused. The quantity of strychnia found was very small, but this was of no moment, as it was merely the surplus after the quantity that had been absorbed into the system. Mr. Robinson, assistant-surgeon to the Stepney Union, and H. R. Davis, deposed that the deceased had access to the surgery of the Union, where strychnia was kept in a cupboard. The deceased always lived happily with her parents. After some further testimony, the jury expressed a wish for further evidence, and the inquest was adjourned.

The inquiry, after having been adjourned four times, was concluded on Tuesday, September 21st, when the jury agreed to the following verdict—"That deceased died from the effects of a deadly poison, called strychnia, but how, when, or by whom administered, they had no evidence to show."

SUICIDE OF A CHEMIST'S ASSISTANT.

An inquest was held on Monday, Sept. 13th, at the Lion Inn, St. James's Street, Brighton, before D. Black, Esq., borough coroner, on the body of Charles Cope, an assistant to Mr. Muriel, chemist, Marine Parade, who committed suicide on Saturday morning by taking a quantity of prussic acid; when the following particulars were adduced:—

Elizabeth Cope, widow of the deceased, deposed that deceased left home, 9, Montague Street, on Saturday morning, about eight o'clock, which was his usual time to go to business. He appeared to be in his usual health and spirits, and witness was not aware that he had anything on his mind to trouble him.—Deceased was very low-spirited on Tuesday, and told witness he had something on his mind. He could not tell her what it was, but had no doubt she would know it some day. He had made no remarks of a similar kind since those on Tuesday, and seemed in better spirits than before on Friday. On Saturday morning he walked twice across the room, and said he wished he had not to go to business that day, and said to witness, "Feel my forehead; doesn't it burn ?" He was not ill on Friday night. He had told witness he had not been well for twelve months, but she had not observed anything the matter with his health. Witness did not think deceased felt despondency from thinking his salary would be inadequate to his wants, and did not know to what he alluded in the conversation on Tuesday. She was married to him on Sunday week. None of his friends knew of his marriage until after it took place. He did not seem to be in any trouble about not having let them know of it. Witness had had no quarrel with him nor cause of unhappiness.

William Hutt, manager to Mr. Smith, wine merchant, Marine Parade, deposed that he had known deceased about twelve months, the whole time he had been with Mr.

Muriel. Witness saw deceased on Friday evening, about half-past nine, when he was very cheerful. On Saturday morning, about half-past nine, Mr. Muriel's boy came across to witness and said he thought there was something the matter with Mr. Cope as he had been a long time down in the cellar, and asked witness to come over. Witness went immediately, and found deceased in the lower cellar, laying on his back, and on taking hold of his head for the purpose of raising him, found he was dead. There was no smell from the mouth of deceased. His face was pale, and his eyes wide open. The mouth was not distorted, and the tongue did not protrude.

Henry Brook Muriel, chemist, Marine Parade, deposed that deceased had been in his service since September, 1857. Witness saw deceased on Friday evening, at ten minutes to ten, but observed nothing particular in him. He bade witness "Good night." Witness had never had occasion to find fault with deceased during the whole time he had been with him. On Friday week he said he wished to go to London on particular business. Witness said, "You have had several holidays lately," and expressed his surprise at his asking, and inquired if the business was particular. He said it was. That was in the morning. In the evening he said to witness, "I have something on my mind, which I wish to open to you." Witness said, "What is it?—you are going to get married, I suppose?" (not thinking he was). He said "Yes." Witness said, "You are a very foolish young man to do so," or something to that effect, and gave him leave to be absent till Tuesday, on which day he returned at eight o'clock in the evening. Since that period he had never settled to business as before, but his mind seemed occupied some other way. Witness had always found him honourable and honest.

In answer to one of the jury, Mr. Muriel said he had missed a bottle of hydrocyanic acid.

Other witnesses were examined, whose testimony was immaterial, the coroner summed up, and the jury, after a brief consultation, returned a verdict of "Temporary insanity."

SUICIDE BY CYANURET OF POTASSIUM.

An inquest was held at the Marine Hotel, Sandgate, Kent, on Thursday, September 9th, before Mr. Delasseux, coroner for the county, to inquire into the death of William Gordon, the Sergeant-Major of the P Battery Royal Artillery, now stationed at Shorncliffe camp, who was found dead in a road leading to the camp early on the morning of Tuesday, the 7th September.

Dr. Robert Burn, Assistant-Surgeon Royal Artillery, deposed that he saw the body of deceased before it was removed from the spot where it was found lying on its face, which appeared to have some livid spots on it. There were no marks of violence on his person, and he thought he had died in a fit; but on examining his pockets, discovered a parcel containing some lumps of a white substance, labelled "Poison," which proved to be cyanuret of potassium. Made a *post-mortem* examination of the body; the mucous membrane generally was much inflamed, and the eyes fixed and glassy. Had every reason to suppose that the deceased had taken some of the above-named salt, from the effects of which he died.

Edward Milgate, a gunner of the P Battery Royal Artillery, deposed that he had known the deceased for eighteeen months. He was a good soldier, respected by the men, and generally cheerful when with his comrades. Witness had been his servant for some time past, and had observed that for the last three weeks there was a marked difference in the manner of the deceased, who seemed dejected. He was ordered by him to procure a small quantity of cyanuret of potassium from the chemists in Sandgate, for the purpose, as represented, of cleaning the gold lace of deceased's cap. He purchased twopennyworth and gave it to deceased, whom he did not see afterwards alive.

Mary Jane Harrison stated that she had walked with the deceased on Sunday evening last. He then told her he intended to poison himself, but she believed he was joking. Remarked that he seemed very silent and miserable.

Lieutenant S. Parry, Royal Artillery, deposed to finding some papers in deceased's room, on which was written, "This is to inform you that when you read this, alas! I shall be no more. May God forgive my wanton rashness. Do not write to my father or friends.—Gordon."

The coroner briefly commented upon the evidence, and the jury, after a short deliberation, returned a verdict of "Temporary insanity."

The deceased was a tall, fine-looking man, twenty-nine years of age, and had been eleven years in the service.

OBITUARY.

MELANCHOLY DEATH OF MR. GEORGE LINDSEY BLYTH, ANALYTICAL CHEMIST TO THE BOARD OF HEALTH.

In the number of this Journal for last July, we had to record the death of a young and promising Chemist, Mr. H. M. Witt, who put an end to his life by taking poison. Another somewhat similar case has now occurred. On the morning of Saturday, the 4th of September, Mr. G. L. Blyth, who, like Mr. Witt, had been educated as a Pharmaceutist, and had subsequently devoted himself to the study and practice of Analytical Chemistry, was found to have poisoned himself with prussic acid. He had retired to his room after breakfast on the previous day, and is supposed to have soon afterwards taken the fatal dose, by which it was evident his life had been destroyed. It was stated in evidence at the coroner's inquest that he had recently received a severe blow on the head in a railway carriage, and that indications of long standing injury to the brain, from serous effusion, were discovered at a *post-mortem* examination. These circumstances were considered by the coroner and jury to justify them in returning a verdict of "Death under the influence of temporary insanity."

Mr. Blyth was well known and much esteemed by a large circle of Pharmaceutical Chemists and others, among whom he has for several years taken an active part in promoting improved Pharmaceutical education. He was for some time Secretary to the Phytological Club. He delivered some courses of lectures at St. Mary's Hospital, and latterly was employed by the Board of Health as Analytical Chemist. He had published on the subject of deodorization and disinfection, in reference to sewage, a subject in which he took much interest. He had also contributed to this Journal.

REVIEW.

The Dispensatory of the United States of America. By George B. Wood, M.D., Professor of the Theory and Practice of Medicine in the University of Pennsylvania, President of the College of Physicians of Philadelphia, &c., &c.; and Franklin Bache, M.D., Professor of Chemistry in Jefferson Medical College of Philadelphia, Vice-President of the College of Physicians of Philadelphia, &c., &c. 11th ed., carefully revised. 8vo, pp. 1583. Philadelphia: Lippincott & Co. 1858.

The fact that this excellent and comprehensive work has reached an eleventh edition is a sufficient indication of the esteem in which it is held in the United States.

The present edition constitutes a thick 8vo volume of nearly 1600 pages, in which the subjects are arranged under four divisions. Part I. contains the Materia Medica, or a description of simple drugs, enumerated alphabetically. Part II. treats of *Preparations*, prefaced by some remarks on pharmaceutical processes. In Part III. we have an account of the more interesting drugs and preparations not comprised in the Pharmacopœias of the United States or Great Britain. The fourth and last part, which is called an *Appendix*, contains some remarks on the Art of Prescribing, Tables of Weights and Measures, Table of Chemical Equivalents, Comparison of Thermometers and Hydrometric Degrees. As an example of the manner in which subjects are treated by the authors, we quote the following article on

> "Valerianate of Ammonia, *Ammoniæ Valerianas*. This salt is formed by saturating valerianic acid with a strong solution of ammonia, evaporating the liquid at the temperature of 150°, until it assumes a syrupy consistence, then mixing it with twice its bulk of alcohol, and submitting the alcoholic mixture to spontaneous evaporation. As the alcohol evaporates, the salt is obtained in crystals. The valerianic acid may be obtained from valerian in the manner described at p. 784. But as valerianic acid, when thus obtained, is expensive, it is best, in making this salt, to employ the artificial acid, generated by distilling fusel oil with a mixture of sulphuric acid and bichromate of potassa, as explained under *Sodæ Valerianas*. The salt formed is perfectly identical, whether made from the natural or artificial acid. Valerianate of ammonia, when freshly prepared, is a white salt, neutral to test paper, crystallizing in quadrangular plates, having a pearly lustre. Its taste is mild and slightly sweet, and its odour peculiar, recalling those of valerianic acid and ammonia. It dissolves in water and alcohol in all proportions. This salt is strongly hygrometric, and, when kept in a bottle which is frequently opened, becomes slightly yellow. Exposed to the air, it quickly deliquesces and forms a thick transparent liquid. When subjected to heat the greater part volatilizes

unchanged; but a small portion is decomposed into ammonia and acid valerianate of ammonia. Its formula is $NH_3, HO + C_{10} H_9 O_3$, or viewed as valerianate of oxide of ammonium $NH_4 O + C_{10} H_9 O_3$.

"*Medical Properties.*—Valerianate of ammonia is not poisonous. Given to dogs in the dose of 150 grains, it produced no inconvenience. As a therapeutic agent it was first brought to the notice of the profession in 1856, by M. Déclat of Paris, who published a paper in that year going to show its remarkable efficacy in the treatment of neuralgia. The preparation which he used was a solution of valerianate of ammonia of uniform strength, made according to the recipe of M. Pierlot, an apothecary of Paris, and which had been extensively given to the epileptics of the Salpêtrière and the Bicêtre. Since then it has been used in various diseases, principally of the nervous system, such as hysteria, epilepsy, chorea, &c. The favourable report of its efficacy in neuralgia, made by M. Déclat, has been confirmed by practitioners in Paris, London, and Dublin. The dose of the salt is from 2 to 8 grains, dissolved in water. M. Pierlot made his solution, mentioned above, by dissolving *a drachm* of valerianic acid in 32 drachms of distilled water, saturating the solution with carbonate of ammonia, and adding to the salt formed 2 scruples of the alcoholic extract of valerian. According to M. Pierlot, the latter addition is necessary in order to preserve the preparation from change; for a simple solution of the ammoniacal salt is rapidly decomposed. The solution of M. Pierlot is neutral, of a brown colour and a strong odour of valerian. It contains 1-25th of its weight of the pure salt. The dose is from 6 to 30 drops, given in water or on a lump of sugar."

BOOKS RECEIVED.

Report on Sewage and Sewer Gases, and on the Ventilation of Sewers. By Henry Letheby, M.B., F.L.S., Medical Officer of Health for the City of London. London: W. Lownds, Printer. 1858.

On the Constitution of the Essential Oil of Rue. By C. Greville Williams, Lecturer on Chemistry in the Normal College, Swansea.

A Guide to the Treatment of Diseases of the Skin; with Suggestions for their Prevention; *for the use of the Student and General Practitioner.* Illustrated by Cases. By Thomas Hunt, F.R.C.S., &c. Third Edition. London: T. Richards, 37, Great Queen Street. 1858.

TO CORRESPONDENTS.

J. G. (Birkenhead).—*Oleine* from olive oil may be obtained by filtering the oil at a temperature about the freezing point of water. This is not absolutely pure, but sufficiently so for general use.

H. M. G. (Huddersfield).—*Writing Ink in Cakes.* Vol. xvi., page 531.

J. (Dewsbury).—*Pharmaceutical Latin Grammar* ; *Hooper's Medical Dictionary.*

J. B. N. (Exeter).—(1.) Should give his name and address, so that a copy of the regulations respecting the Examination may be forwarded to him.—(2.) Sulphuric acid is employed for the purification and bleaching of tallow ; about two per cent. of the strong acid is mixed with the water in which the tallow is heated. See *Ure's Dictionary of Arts, &c.*

R. H. D. (Newcastle).—*Oleum Morrhuæ cum Ferro.* Vol. xiv., page 427, and Vol. xv., pp. 239 and 480.

Alpha (Bridlington).—The price of *Ede's Practical Facts in Chemistry* is 3*s.* 6*d.*

A Chemist's Assistant (Hereford).—Should apply to the proprietor.

"*Amicus*" (Welshpool).—See Vol. xvi., page 152.

W. L. M. (Ardrossan).—The prescription alluded to is written purposely to mislead those who are not in the secret.

A. P. S. (Cambridge).—*Syrupus Ferri Pyrophosphatis.* Vol. xii., page 498. *Hypophosphite of Soda.* Vol. xvii., page 522.

T. B. (Burslem).—We cannot supply the information desired.

Instructions from Members and Associates, respecting the transmission of the Journal, before the 25th of the month, to the Secretary, Elias Bremridge, 17, Bloomsbury Square, W.C.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington Street. Other communications to the Editor, 15, Langham Place.

THE PHARMACEUTICAL JOURNAL.

VOL. XVIII.—No. V.—NOVEMBER 1st, 1858.

THE WORKING OF THE NEW MEDICAL ACT—THE ELECTION OF THE COUNCIL—REGISTRATION—THE PHARMACOPŒIA, PHILOSOPHY, AND PHARMACY.

The arrangements under the new Medical Act are causing some excitement in the profession. During the several stages of the Bill, in its progress through Parliament, various amendments were introduced, with a view of reconciling conflicting interests; and even in the last stage, after the public discussions had terminated, some further alterations, by way of verbal correction, were made at the suggestion of influential parties. Thus one compromise after another was assented to, until opposition was worn out, and the Bill was tortured into a shape in which its original tendency was considerably modified. At one time Schedule D, illustrating the mode of keeping the register, was so framed as to give an implied exclusive status to Fellows of the Royal College of Physicians, which, being objectionable to the representatives of the Edinburgh graduates, was remonstrated against, and the column defining the title of practitioners was left blank, to be filled up by the Medical Council.

The election of the Council is not yet complete. The following members, however, are elected:—Dr. Alexander Wood, to represent the College of Physicians of Edinburgh; Dr. Andrew Wood, the College of Surgeons of Edinburgh; Dr. Watson, the Faculty of Physicians and Surgeons of Glasgow; Dr. Apjohn, the University of Dublin. We believe Mr. Lawrence, Sir James Clark, and Sir Charles Hastings are among the representatives of the Government in England, and Dr. Stokes in Ireland. At a meeting of the Royal College of Physicians of England, held on Friday, the 22nd Oct., Dr. Watson was unanimously elected to represent the College. Several other names have been mentioned; among others, Dr. Alderson, and also Dr. Christison and Mr. Syme, of Edinburgh. The Universities of Oxford and Cambridge having fixed the 29th Oct. and 4th Nov. for their elections, we shall not know the result in time for press. It is understood that Mr. Tegart will represent the Apothecaries' Company, and the name of Dr. Francis Hawkins has been mentioned as Registrar; although with regard to this appointment and some others, we have at present no authentic information. The names already known to be among the members of the Medical Council, without mentioning others who are stated to be candidates, are a sufficient guarantee for the efficiency and integrity of the Board.

The success or otherwise of the Medical Act will depend on the profession itself. It is not offered as a solution of the problem of medical reform, and it affords no direct and positive protection against quackery; but is simply an instrument, by the discreet and judicious use of which, the isolation of the members of the profession from ignorant and unauthorized pretenders may be secured. This is to be effected by means of registration, and the recognition of the several classes of the profession under their respective titles, the unauthorized assumption of which constitutes the principal offence punishable under the Act. To ensure the efficiency of the proposed remedy for existing evils, it is important and necessary that the system of registration should be complete; that it should be maintained in all its integrity by the profession, and under-

stood by the public. This primary condition of success being conceded, it will be a natural result that, so long as the profession deserves and enjoys the confidence of the public, the power of the ignorant pretender will be kept in check, and quackery will be at a discount. The quack, although not directly prohibited from practising, must throw off the mask and appear in his true character. He will no longer be empowered to assume the title of Doctor or Surgeon. The responsibility of his conduct will be thrown upon himself, and in the event of a fatal result, he may look forward to a coroner's inquest and a verdict for manslaughter.

Meetings of Medical Practitioners have been held at several provincial towns, with a view of establishing registration societies, and thus assisting in giving effect to the Act. The policy of such united action in the profession cannot be doubted.

Another movement is also in progress, having another object, namely, the advocacy of the special claims of the general practitioners. On Tuesday, Oct. 19, a deputation, with Dr. Brady, M.P., had an interview with the Secretary of State (Mr. Walpole), and presented a memorial on the subject of "the grievances of the General Practitioners, who constitute nine-tenths of the Medical Practitioners in this country: and praying that this large, influential, and highly educated body of men should be properly and efficiently represented in the New Medical Council." "Mr. Walpole" (we are informed) "paid great attention to the various speakers, and appeared to concur in almost all that was said." A general meeting was held on Wednesday, the 27th, at the Freemasons' Tavern, for the purpose of forming an association to watch over and protect the interests of the great body of General Practitioners. We should regret to see a revival of the old class hostilities, or civil wars, in the profession, just at the time when an opportunity is offered for the consolidation and protection of their general interests.

The College of Physicians, being empowered by the new Act to obtain a new Charter of Incorporation, has the opportunity of rectifying certain imperfections in its laws and constitution which have tended to diminish the popularity of that ancient Corporation in the profession. The draft of the Charter, with the proposed amendments, was published several years ago, and we are not aware of any obstacle to its early adoption, which, among other objects, will provide for the admission of a considerable number of new fellows, thus securing to the College a corresponding amount of strength and influence.

We have heard it noticed as a defect in the Act, that it makes no allusion to the existence of Pharmaceutical Chemists, and contains no provision relating to Pharmacy, with the exception of the section requiring the publication of a national Pharmacopœia, which duty is entrusted to the Medical Council. The omission of Pharmacy, however, was intentional, the 55th section excepting Chemists and Druggists from the operation of the Act, as the introduction of this element into the Act would have furnished additional matter for discussion, with a probability of fresh sources of difficulty in arriving at a satisfactory arrangement. Whatever amendments may be required in the law relating to Pharmacy, could be more easily and properly introduced in a short Act to amend the Pharmacy Act, which would not interfere with the interests of the medical profession.

In our number for September we alluded to the symptoms of renewed activity in the Pharmacopœia Committees in London and Edinburgh. We now subjoin a copy of a letter issued in August, and circulated among Medical Practitioners and Chemists in Scotland:—

Royal College of Physicians, Edinburgh, 11th August, 1858.

"Sir, — A Committee of this College is at present engaged in collecting such information as it is presumed the New Medical Council will expect from

the Royal Colleges, before a National Pharmacopœia is published under their auspices.

I am instructed by the Committee to request from you any information which you can supply on the following heads:—

1. Articles of Materia Medica frequently prescribed, but not included in the last edition of the *Edinburgh* Pharmacopœia.
2. Changes on any of the processes of the Edinburgh Pharmacopœia which you consider desirable.
3. New processes which you follow, or are inclined to suggest, for the preparation of any article in the Pharmacopœia.

Any communication on the above subjects, if made to me, will be highly valued, and duly acknowledged by the Committee.

I am, Sir, your obedient Servant,

WILLIAM ROBERTSON, M.D.,
Secretary of Pharmacopœia Committee.

The Secretary of the North British Branch of the Pharmaceutical Society having forwarded a copy to the Committee in London, the subject was considered, and communications have subsequently taken place between that Committee and the Pharmacopœia Committee of the Royal College of Physicians, with the view of entering on the work conjointly with the College and Committee in Edinburgh. The Committee of the Society in London having seriatim considered the Materia Medica, and a large proportion of the preparations, we are enabled to form some idea as to the amount of labour which the completion of the task would require. The revision of the Pharmacopœia comprises three separate heads. First:—The decision as to the admission of new remedies or preparations, and the rejection of such as have become obsolete. Secondly:—The investigation of processes or formulæ, which, being imperfect or unsatisfactory, require improvement; in this part of the work experiments are necessary, which is also the case with new formulæ recommended for introduction. Such experiments and investigation occupy time, and constitute a chief source of delay in the revision of the Pharmacopœia. Thirdly:—The assimilation of the formulæ in the three Pharmacopœias intended for purposes identical, or nearly so, but differing slightly in proportions or composition. In many instances these differences are so trifling, that no difficulty is likely to arise in adjusting the proportions to one uniform scale. There may be other cases in which opinions may differ as to which preparation is the best; if so, all parties must remember that a mutual concession is necessary, and these matters of detail must not be allowed to interfere with the progress of the national work.

One of the most difficult questions will probably be the weights and measures. It being positive that the same weights and measures must be employed in England, Scotland, and Ireland, it must next be decided whether the London and Edinburgh Colleges are to follow the Dublin College by the adoption of avoirdupoise weight? Whether the Dublin College is to retrace its steps and resume troy weight? or whether all the Colleges are to lay aside their accustomed weights and adopt the decimal system which prevails on the Continent? The advantage of changing from a twenty gr. scruple to a scruple of eighteen grs. and a fraction, and reducing the drachm in the same proportion, we have not been able to ascertain (except as an exercise for apprentices in arithmetic); but whatever may be the decision on this or on any other question at issue, it is satisfactory to know that the decision will be binding equally in all parts of the kingdom; and consequently a prescription written in London would be correctly prepared in Dublin or Edinburgh, and *vice versâ*, which is not now the case as a general rule. The decimal system is by some Chemists warmly advocated as being more scientific, more uniform with continental practice, and better adapted for chemical calculation than the arbitrary system of ounces, drachms, and scruples, to which custom has reconciled us. We shall not attempt here to argue and weigh in the balance the respective merits of the competing weights,

but unless it can be clearly shown that any proposed change could be introduced without creating confusion, doubt, and danger at the dispensing-counter, we say, most emphatically, it were better to go on with the old troy weights, which every apprentice understands, than to flounder in fractions or exult in decimals.

This argument applies no less to chemical nomenclature than to weights and measures. The progress of science, and the discovery of fresh elements or facts in chemical research, may cause one theory to displace another like the waves of the sea, each one in succession rising and foaming until it is buried in oblivion by the next. The philosopher derives infinite pleasure and satisfaction from the contemplation of these steps in the advancement of science; and it is the business of his life to invent or discover some theoretical rule or equation by which the phenomena of nature may, for the time being, be understood and described in definite terms. Such speculative views and aspirations, however, are out of place in the Pharmacopœia. At a late meeting of the British Association at Leeds, during a discussion on some proposed changes in the chemical equivalents, a Pharmaceutist was significantly reminded by a warm advocate of the innovation, that "philosophy is not pharmacy,"—a sentiment in which we not only concur, but rejoice in the fact. Pharmacy is a science of life and death; a misunderstanding between the prescriber and the dispenser, whether arising from confusion in terms, or ambiguity in regard to quantities, may lead to fatal results. We have already experienced enough inconvenience, not only with the three Pharmacopœias, but also in consequence of the introduction of scientific nomenclature, founded on the theory of to-day, and liable to be superseded by the discoveries of to-morrow. The habit of coining language, and inventing new modes of expressing old ideas or describing familiar substances, becomes a mono-mania which leads the enthusiast into the regions of mystification. No one but a professed aëronaut could float in the artificial atmosphere thus created. Let us imagine, for example, the confusion that would arise from the adoption of sixteen as the equivalent number of oxygen, which, according to the favourite theory of some eager philosophers, is correct, and in accordance with the laws of nature and chemical combination. Imagine the perplexity of a Pharmaceutical Chemist when compounds, affected by the change, occur in prescriptions where (as in the case of chloride of mercury) the same term denotes, according to the old theory, a safe medicine in constant use—according to the new theory, a deadly poison. Assuming that the equivalent number of oxygen is to be sixteen, the binoxides would be promoted to the rank of oxides, as a corporal is promoted to the rank of a sergeant in the army, and with a similar prospect of destruction to human life. The sesquioxides would be displaced from their position, and their identity could only be maintained by the supposition that atoms may be of two sizes to suit their convenience. It would be useless to descend into the ramifications of confusion which would result from this change in the symbol of an element which enters as a constituent in an endless variety of compounds, organic as well as inorganic. The adoption of this and other similar hypothetical systems lately propounded, and by some persons called philosophy, would oblige the Chemist to go to school again and commence his studies *de novo*.

In the higher walks of abstract chemical science the same objection does not equally apply, for in these philosophical researches the philologist may be allowed some latitude in the cultivation of his creative talent. It matters little whether the name given to a rare compound scarcely likely to occur except in the laboratory of the alchemist, consist of one syllable or ten, and even if a subsequent discovery should place it in another series, the inconvenience is not likely to extend beyond the walls of the laboratory. On reference to modern chemical works we find evidence of extraordinary skill and invention in nomenclature. Some words are so long, that no person, unless specially trained for

the purpose, could pronounce them without stopping in the middle to take breath. For example:

Trimethylamylphosphonium
Triethylamylphosphonium
Methyltriethylphosphonium
Bibromonitracetonitrile
Succinylbisulphophenylbibenzamide

Many other examples might be given if necessary.

By the force of habit and years occupied in study, these apparently intricate complications become perfectly simple and easy of comprehension, and the inventor of the hypothesis on which the superstructure is founded, will expound his views and recapitulate his long words with as much fluency and volubility as a musical composer executes a difficult passage, to the delight of an astonished audience. The Chinese juggler acquires by practice the power of throwing knives between the fingers of his comrade, and within less than half an inch of his head or body without touching him; and such instances of mechanical dexterity serve to illustrate the extent to which the faculties, whether bodily or mental, may be developed by regular training and constant practice.

It must not be supposed that we undervalue philosophy, or would discourage the cultivation of the intellect to the highest degree of which it is capable. It is impossible to over-estimate the researches of those great philosophers, from whom emanated the discovery of the laws which regulate the motions of the planets, the occurrence of eclipses, the attraction of gravitation, the practical applications of steam and electricity, the chemical constitution of the materials of which the earth is composed. But the misapplication of philosophy, by the injudicious introduction of arbitrary terms, founded on ever-varying hypotheses, into pharmaceutical nomenclature is not only attended with inconvenience but danger, as we have had occasion to demonstrate on previous occasions.

The capacity and position of those for whose use and instruction the Pharmacopœia is intended, should not be lost sight of. It must be recollected that medical men are too much occupied with their professional duties to enter into the study of each new system of chemistry as it appears on the promulgation of improved theories. It is also an important fact that, notwithstanding the exertions of the Pharmaceutical Society during a long series of years in promoting a regular system of pharmaceutical education, the law does not even now require the dispensers of medicine to possess a competent knowledge of Chemistry and Materia Medica; and even if this branch of education were complete, no amount of sagacity would enable the dispenser to know with certainty where an ambiguous term is used, which of the two meanings was intended by the prescriber.

The aim of true philosophy is the establishment of facts, the explanation of the phenomena of nature on sound scientific principles, and the attainment of precision in the mode of conducting observations or experiments and reporting the results. But when philosophy degenerates into mystification, and science becomes entangled in the meshes of speculative theory, this is not the kind of philosophy which is calculated to enlighten the pharmaceutical student, or to promote the real object of Pharmacy, namely, the safe and efficient administration of medicine.

TRANSACTIONS

OF

THE PHARMACEUTICAL SOCIETY.

MEETING OF THE COUNCIL, 6*th October*, 1858.

Present—Messrs. Bell, Bird, Brew, Bucklee, Davenport, Deane, George Edwards, J. B. Edwards, Hanbury, Hollier, Meggeson, Morson, Peacock, Squire, and Waugh.

The following were elected

MEMBERS.

LONDON .....Ford, Charles
DENBIGH.....Roberts, Peter

MINOR EXAMINATION, 19*th Oct.*

Anthony John Lilley .....Bedford
Cocking, Thomas.....Maldon
Laming, Wellberry .....Market Rasen
Moore, Francis Samuel.....Bristol
Rayner, John Charles .....Uxbridge

REGISTERED APPRENTICES.

NAMES.	RESIDING WITH	ADDRESS.
Atherton, Charles Isaac	Mr. Bromley	Liverpool
Backhouse, Noah	Mr. Rowntree	London
Bland, Percy Owen	Mr. Fox	London
Capern, Alfred	Mr. Anthony	Bedford
Dawson, James Henry	Mr. Telfer	Oxford
Harper, William James	Mr. Gent	Macclesfield
Midgley, Charles	Mr. Rimmington	Bradford, Yorks.
Midgley, John Edward	Messrs. Lynch & Wilkinson	Manchester
Monkhouse, Joshua	Mr. Davies	Gainsborough
Parry, William	Mr. Christopher	Crickhowell
Pertwee, Frederic	Messrs. Fincham	London
Pickup, Robert Lansdale	Mr. Pickup	Salford
Pryce, Alfred Clement	Messrs. Picton & Hatton	Warrington
Wootton, Alfred Charles	Mr. Wootton	Luton

EXAMINATION, EDINBURGH, 13*th Oct.*, 1858.

MAJOR.

Noble, Alexander.....Edinburgh

MINOR.

Allan, William .....Dumfries
Crossby, Joseph Parker .....Bakewell
Stewart, James .....Edinburgh

REGISTERED APPRENTICES.

NAME.	RESIDING WITH	ADDRESS.
Fuller, Thomas G.	Mr. Fuller	Burntisland, Fifeshire
Thomson, George G.	Messrs. Macfarlan & Co.	Edinburgh

PHARMACEUTICAL MEETING.

Wednesday, October 6th, 1858.

MR. JACOB BELL, PRESIDENT, IN THE CHAIR.

THE following

DONATIONS TO THE LIBRARY AND MUSEUM

were announced :—

Journal of the Society of Arts, from the Society.
Journal of the Photographic Society, from the Society.

The Assurance Magazine, from the Institute of Actuaries.
Proceedings of the Medico-Chirurgical Society, from the Society.
The Quarterly Journal of the Chemical Society, from the Society.
Valdieri e Le Sue Acque, by Giov. Garelli, from the Author.
Journal de Pharmacie de Bruxelles, from the Society.
Journal of the Linnean Society, from the Society.
Catalogue of the Royal College of Physicians, London, from the College.
An Inquiry into the Properties of Aconitum Napellus, with four Pamphlets, by Dr. Fleming, from the Author.

DISTRIBUTION OF PRIZES.

The Chairman said the first business of the meeting would consist in presenting to some of the pupils who had attended the lectures at that Institution during the previous session the prizes and certificates which formed part, but only a part, of the rewards obtained for their diligent attention to their studies. The Professors would report the results of the examinations in their respective classes.

CHEMISTRY AND PHARMACY.

Dr. Redwood said it was always a gratifying duty to award the prizes given by the Council to the successful competitors at the examinations. He fully agreed with the President, however, that these were but a small part of the rewards obtained by diligent pupils. The classes had been better attended last session than on any former occasion. The laboratories had been full during nearly the whole of the session, the attendance at the lectures had been more regular and larger than usual, and the conduct of the pupils had been most satisfactory. He only regretted that there were not a larger number of prizes to award, for he was quite sure there would have been worthy recipients for them. There were seven competitors in his class, and five of these were rewarded for the superior merit of their answers.

The following were the questions for examination :—

1. What is the specific gravity of a liquid one fluid ounce of which weighs 503.125 grains?
2. What is the latent heat of water, and how is it determined.
3. What effect is produced upon a ray of polarized light by causing it to pass through a tube filled with oil of turpentine?
4. What is the formula for the preparation of *Mistura Ferri Composita* of the London Pharmacopœia? Describe the best mode of making this mixture, the decomposition which occurs in the process, the nature of the change which the mixture is liable to undergo when kept for some time, and the best means of preventing such change.
5. Describe the process of the London Pharmacopœia for Potassio-tartrate of Antimony, and explain the changes which occur in this process.
6. What are the specific gravities of *Liquor Ammoniæ* and *Liquor Ammoniæ Fortior*, and how much ammonia by weight is contained in 100 grains of each of those liquids?
7. How is Prussiate of Potash made, what is its composition, and what change does it undergo when heated to redness in a close vessel?
8. How are *Lactic* and *Butyric* Acids obtained? What are the properties of these Acids, and the formulæ representing their composition?

The prize and certificates of merit were awarded as follows :—

Prize Medal.....Mr. John Robert Thomson

Certificates of Merit { Messrs. John Joseph Nicholson
William Workman Dunhill
John Twinberrow
James Green

BOTANY AND MATERIA MEDICA.

Mr. Bentley said the diligence, attention, and consequent progress of the students in his class during the last session had never been surpassed. The

attendance had been much larger and more regular than usual, both at the Institution and also at the Botanical Gardens.

The questions for examination were :—

1. Describe the structure and mode of formation of Punctated Woody Tissue, and mention the Orders of Plants in which it is especially found.
2. What are the distinctive characters between the stems of Acotyledonous, Monocotyledonous, and Dicotyledonous Plants? What is Cork, and from what part of the plant is it obtained?
3. What are the substances required as food by plants? Describe the mode in which the food is taken up.
4. What are the distinctive characters between Monkshood and Horse-radish roots? State the Plants and Natural Orders from which they are respectively obtained; their medicinal properties and the sources of their activity.
5. What are the botanical and geographical sources of Guaiacum? Describe the modes of obtaining it, its physical and chemical characteristics, and the means by which it may be detected when used to adulterate Scammony.
6. What are the botanical and geographical sources of Jamaica Sarsaparilla? Describe the difference between mealy and non-mealy Sarsaparillas, and mention the characters of the best commercial varieties.
7. Give the essential characters of the following Natural Orders:—*Papaveraceæ*, *Geraniaceæ*, *Cucurbitaceæ*, *Gentianaceæ*, *Convolvulaceæ*, *Euphorbiaceæ*, *Orchidaceæ*, and *Melanthaceæ*. Enumerate the officinal plants of each Order, and their properties.

The prize and certificates of merit were awarded as follows :—

PRIZE MEDAL..... .....Mr. John Joseph Nicholson

CERTIFICATES OF MERIT { Messrs. John Twinberrow
James Green

PRIZES FOR HERBARIA.

Mr. BENTLEY said he had been requested to announce the result of the competition this year for the prize offered by the Council for Herbaria. This subject was fully entered into last year, when there were seven competitors. This year, he was sorry to say, there were only two, to both of whom, however, the Council had awarded some distinction. Mr. James Frodsham Robinson would receive a bronze medal for his collection of 380 plants, which were well named and deserving of considerable merit. Mr. George Henderson Whitehouse, the other competitor, having been an unsuccessful competitor last year, was advised to try again. He had done so, and was rewarded with a certificate of merit. These would be distributed at the next meeting, on the 3rd of November.

Mr. Bentley took the opportunity of mentioning that certificates of attendance at the lectures were given by the Professors to those students who applied for them, and who attended throughout the entire of either course of lectures.

The following communications were then made: —

CITROMEL AND TARTROMEL OF IODIDE OF IRON.

BY MR. JOHN HORNCASTLE.

So many able experimentalists have been engaged in the production and improvement of the preparations of iodide of iron, that I feel some diffidence in inviting attention to two new combinations, fearing I might lay myself open to the charge of wishing to increase their number, without adequate advantage in the improvement of their quality. But as all the preparations at present in use are in some respects defective, especially as regards their stability, I feel confident that my investigations have been directed to a useful object, and hope the results will be interesting to the Members of the Pharmaceutical Society.

About six years ago I was informed by Mr. C. F. Palmer, of Birmingham, that citric acid would prevent the spontaneous decomposition of solutions of iodide of iron. Conceiving that this property of the acid might be made

available for preserving solutions for officinal use, I commenced a series of experiments, to ascertain the extent of its preservative powers, and likewise whether the other common vegetable acids, viz., the tartaric and acetic, possessed similar properties.

Six solutions were made, each containing five grains of iodide of iron in a fluid ounce of distilled water, and to five of them citric acid was added, in proportions varying from one to five grains. All the solutions were perfectly clear and colourless. They were put into ounce-and-half phials, not corked, but the mouths covered with paper, to keep out the dust, and placed in a window where they were freely exposed to the light, though usually shaded by a blind from the direct rays of the sun. They were examined and tested with starch paper at intervals of a few days. The solution which contained no citric acid had deposited a considerable quantity of brownish-yellow powder, and exhibited other signs of being in an advanced stage of decomposition at the end of a week; whereas no indication of decomposition could be detected in the other solutions till the following periods :—

Solution with	1	grain of citric acid,	21	days.
"	2	grains "	30	"
"	3	" "	60	"
"	4	" "	74	"
"	5	" "	93	"

With much stronger solutions (one part to two, four, &c., of water), citric acid was found to hasten rather than retard decomposition.

Similar courses of experiments were tried with acetic and tartaric acids. The former prevented the deposition of oxide of iron, but not the separation of free iodine, and therefore failed to fulfil the most important requirement. The latter answered even better than citric acid. Solutions were prepared in the same manner as above, substituting tartaric for citric acid, and exposed to the same rigid test of their stability. The solution containing one grain of acid gave no indication of decomposition till after the lapse of ninety-four days, and the others not till from seven to eight months, when they began to change almost simultaneously. The length of time these solutions were preserved, was not so regularly proportionate to the quantities of acid as in the experiments with citric acid. In strong solutions tartaric acid exerted no preservative influence.

It appears, then, that citric and tartaric acids would be useful additions to weak solutions of iodide of iron intended to be kept for only a moderate period, as is usually the case with the medicines supplied to patients; but for preserving stronger solutions, such as would be adapted for officinal use, they are quite ineffectual. I have therefore tried them in conjunction with saccharine matter, and on account of the liability of cane sugar to be converted into the less soluble grape sugar, I selected clarified honey, and found the combination a very perfect vehicle for iodide of iron. The following are the formulæ I have adopted :—

CITROMEL FERRI IODIDI.

℞ Liq. Ferri Iodidi, f℥j.
Mellis, ℥xij.
Acidi Citrici, ℥vj.
Aquæ Distill. Bullient., f℥j. vel q.s.

Liquefy the honey by means of heat, and add, first the citric acid previously dissolved in the water, then the solution of iodide of iron; mix well together, making up f℥xij. with distilled water, and filter.

TARTROMEL FERRI IODIDI.

℞ Liq. Ferri Iodidi, f℥j.
Mellis, ℥xij.
Acidi Tartarici, ℥ss.
Aquæ Distillat. Bullient., f℥j. vel q.s.

Proceed as directed for the Citromel.

These preparations are about the same strength as the syrup of the Pharmacopœia.

The Liquor Ferri Iodidi indicated contains an ounce of iodide in a fluid ounce, and may be conveniently made as follows:—

Take of Purified Iodine, ℥ivss.
Iron Wire or Filings, ℥iss.
Distilled Water, q.s.

Put the iron into a flask with three ounces of distilled water, and add the iodine a little at a time, allowing the solution to cool after each addition. When the whole has been added, set aside for a day or two and then filter, washing the insoluble residue with sufficient recently boiled distilled water to make up five fluid ounces and a half of clear solution.

The Citromel and Tartromel Ferri Iodidi will keep for an almost unlimited period, even in bottles that are frequently opened to take out small quantities. They will also keep well when diluted, and in this respect they have a remarkable superiority over the syrup of iodide of iron. The following mixture has been kept more than a year without any particular care, and did not manifest the slightest tendency to decomposition:—

℞ Citromellis Ferri Iodidi, f℥j.
Tinct. Gentianæ Com., f℥j.
Aquæ Distillatæ, f℥xiv. ℿ

I shall not attempt to explain the *modus operandi* of the citric and tartaric acids, but will merely observe that they do not appear to enter into chemical combination with the iodide, as their effect is not dependent upon any definite proportions.

Having stated the results of my own experiments, I must leave it to the judgment and experience of others to decide whether these preparations are worthy of a place in the catalogue of remedial agents. They will require the test of longer and more extensive employment to establish their claim, but I feel assured they will be found to possess some valuable characteristics that will recommend them to both the Pharmaceutical and Medical professions.

12, *Stanhope Terrace, May* 21*st*, 1858.

PREPARATION OF SPERMACETI OINTMENT.

BY MR. RICHARD W. GILES.

I BEG to be permitted to bring under notice of the Pharmaceutical body a sophistication of one of our most ordinary preparations. I refer to the Unguentum Cetacei; and I am obliged to believe that the formula for this ointment is tampered with to an unparalleled extent by the positively troublesome frequency of complaints, because it has a yellow appearance instead of being "beautifully white." From the difficulty which I sometimes experience in satisfying customers who object to its yellow tinge, and from the occasional impossibility of satisfying them at all, I am of opinion that this practice is not confined to obscure quarters, but that it prevails amongst shops deservedly holding a high reputation.

It is well known that private formulæ for preparing spermaceti ointment often replace with lard the prescribed olive oil, which sufficiently explains the "delicately white" appearance after which some people yearn more anxiously than for the more important qualities; but I would ask—putting aside the propriety of a rigid and literal adherence to the Pharmacopœia—whether this is a substitution which the efficiency of the product justifies. Lard is at the best a less agreeable body than salad oil, from which it differs in the most essential

characters. It is more prone to become rancid, and thus to communicate absolutely injurious properties to the ointment; and, according to my belief, it makes a much less soothing and emollient application. I am sure that this subject is not too small for our consideration, though I fear that in common with ointments generally, it has been too much overlooked by Pharmaceutical Chemists.

Clifton, September 25th, 1858.

Mr. Francis said he had made spermaceti ointment for thirty years, had always made it white, and found it always give satisfaction; but he never used lard, and believed he followed the instructions of the Pharmacopœia. The olive oil he used was colourless, and upon this the difference in the colour of the ointment depended.

Mr. Barnes thought the bleached olive oil sometimes used for making spermaceti ointment was more liable to become rancid than the oil in its unbleached state.

Mr. Whipple considered that those who used bleached oil violated the instructions of the Pharmacopœia as much as those who used lard. The practice could not be too strongly condemned.

Dr. Redwood could not agree in condemning so strongly the use of colourless olive oil for the preparation of spermaceti ointment. He was not aware of anything in the Pharmacopœia indicating what was to be the exact colour of olive oil, or how long it was to be kept, and in what way kept, before being used; and he knew from experience that it could not be kept, exposed to light, without its becoming bleached. The specimens of olive oil in the Museum of the Society were always colourless, in consequence of their being exposed to the light in a glass case, and could it be said that this oil was unfit for use? Mr. Barnes had said that when bleached it was more liable to become rancid. Possibly this might be the case when chemical agents were used for bleaching it, but he was not aware that it was necessarily more prone to become rancid when colourless than it was when in the ordinary coloured state. Indeed, there were some circumstances which would seem rather to lead to an opposite conclusion. Thus, he had observed that during the bleaching of olive oil there was usually a deposit formed, consisting of a flocculent matter, and this organic matter, if retained in solution, would be likely to promote the kind of change which occurs when the oil becomes rancid. Then, again, the olive oil used by chronometer makers for lubricating the delicate machinery of watches was perfectly colourless, and yet rancid oil would be quite unfit for such purpose. He was not aware that any experiments had been made specially to determine the relative values of bleached and unbleached olive oil as applications to the skin, and some further information on that point was therefore wanted. The public evidently approved of spermaceti ointment made with bleached oil, and until it could be shown that this was inferior to the other, he thought it too much to condemn the use of bleached oil as an unwarrantable deviation from the instructions of the Pharmacopœia.

Mr. Whipple observed that in preparing the oil used by chronometer makers chemical agents were employed which rendered the oil quite unfit for use in Pharmacy, therefore any reference to that oil was beside the question. There were several methods adopted for bleaching fixed oils, one of which consisted in treating it with animal charcoal.

The President thought this a very suitable question for discussion at their meetings. It related to one of those points in reference to which some difference of opinion was likely to occur among practical men who were anxious to improve the quality of their preparations. There was certainly nothing in the Pharmacopœia that restricted them from using olive oil which had been exposed to the light, and thus had lost some of its usual colour; and if they had reason

to believe that this oil was as good as the coloured, if they found the ointment made with it was as good as that made with the other, and was preferred by the public, he thought, in the absence of any evidence on the other side, they were justified in using it.

Dr. Edwards exhibited some specimens illustrating the application of photography to the printing of patterns on cotton and other fabrics of that sort, as recently suggested by Mr. Mercer.

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

The Annual Meeting was held in the Royal Institution, on Thursday evening, September 30th, 1858, the President, Mr. H. S. Evans, in the Chair.

After some preliminary observations, the President called upon the Honorary Secretary, Mr. Shaw, to read the

REPORT.

At the close of the ninth year of the operations of this Society, the Council have the gratification to report its continued prosperity, as well in internal vitality as external usefulness and public favour and recognition. At the close of the eighth Session the number of Members on the roll of the Society was 131, and of Associates 12. At the present time the number of Members is 152, of Associates 12, of whom 42 Members and 5 Associates have been elected during the Session; and while congratulating the Society upon this gratifying increase to its numerical strength and social prosperity, your Council would impress upon all the increased advantage there would be derived, collectively and individually, by Members taking a more enlarged participation in the various proceedings of the Society; and would suggest that the more frequent introduction of subjects of every-day experience, in which all could take a part, at the ordinary meetings of the Society, would greatly augment its usefulness. And your Council would most particularly urge upon the younger Members and Associates the advantages to be derived by them from the diligent use of the Meetings, the Laboratory, the Library, and Museum.

The General Meetings have been regularly held during the past Session, and it is most gratifying to note that while the important character of the subjects that have been brought before the meetings has been fully maintained, the attendance has considerably increased over that of former Sessions.

Your Council have received from your Librarian, Mr. Walker, a most encouraging report of the great use which has been made of the Library. Through the liberality of several of our Members and friends, seventy-six volumes have been presented during the Session, and eighteen volumes have been added by the Council, making a total increase of ninety-four volumes; and all of these are works of the most useful character.

The number of volumes in the Library at the present time is 324. During the year 77 Members have made use of them, borrowing 577 volumes; and in addition to this greatly increased circulation, constant use is made of the Library for purposes of reference by Members and Associates.

To the Museum many most valuable additions have been made through the liberality of numerous Members and friends, but still many vacancies exist, which are rapidly being filled up.

One of the most important subjects which have occupied the attention of your Council during the past Session has been the Government Bill for regulating the Sale of Poisons.

[The paragraph relating to this subject is omitted, the substance of it having been already published in this Journal, vol. xviii., p. 11.—Ed.]

Your Council, in conclusion, have to congratulate the Society on the very satisfactory state of the finances as set forth in the Treasurer's statement, showing a balance of £18 13*s.* 6*d.* to the credit of the Society.

A copious list of books has been furnished by the Librarian, which it is considered desirable to add to the Library, and your Council will take the earliest opportunity of making such a selection as may prove most acceptable to the Members, and at the same time most conducive to the objects of the Association.

The Treasurer, Mr. SUMNER, then read the Financial Report, which showed receipts of £105 6*s.* 9*d.* from all sources for the year, and a balance in hand of £18 13*s.* 6*d.*

The Liverpool Chemists' Association in Account with R. Sumner, Treasurer.

Dr. SESSION 1857-58. Cr.

	£	*s.*	*d.*		£	*s.*	*d.*
To Books—Library	24	0	6	By Cash in hand	3	2	11
" Printing and Stationery	13	11	6	" Arrears (1 Member)	0	10	0
" Postages and Sundry Expenses...	2	7	1	" Subscriptions from 142 Members	71	0	0
" Coffee and Attendance at Public Meetings	11	0	8	" " " 12 Associates	3	0	0
" Delivery of Circulars, &c.	11	0	0	" Donations to Library:—			
" Rent	10	10	0	From Messrs. Meggeson & Co. £5 0 0			
" Subscription to Cavendish Society	1	1	0	" Mr. S. Johnson.. 5 0 0			
" Laboratory Fees (Dr. Edwards)	13	2	6	" Mr. A. Coupland 2 4 6			
" Cash in hand	18	13	6		12	4	6
				" Library Fines and Catalogues sold	2	6	10
				" Laboratory Fees	13	2	6
	£105	6	9		£105	6	9

Examined and found eorrect, RICHARD BIRD, J. DAKIN, } *Auditors.*

Dr. EDWARDS, in moving the adoption of the Report and Financial Statement, congratulated the Society that they had been very successful in their endeavours to unite the body of Chemists in Liverpool in scientific pursuits, and had interested them in matters not immediately eonneeted with trade, while they had endeavoured also to promote the advantage of the younger Members. He had the more satisfaction in witnessing this suecess because he had found that the body of Chemists had not been so successfnl in other places; and, in fact, in no place did such a society seem to thrive out of London, except in Liverpool—proving that in scientific as well as commercial progress, they were next to the metropolis. Having referred to Edinburgh as exceptional, because partaking of the metropolis, and being supported by an annual grant therefrom, he proposed the adoption of the Report, and that the Laws, Bye-Laws, and Transaetions of the Assoeiation, with a list of the Members and Catalogue of the Books in the Library, be printed and circulated along with the Report and Statement of Aecounts; which, being seconded by Mr. SUMNER, was carried unanimously.

The SECRETARY read the Report of the Speeial Fund for defraying the expenses ineurred in opposing the Sale of Poisons Bill in the last session of Parliament:—

Special Fund for defraying the expenses incurred in opposing the Sale of Poisons Bill in account with the Secretary. 1858.

Dr.	£	*s.*	*d.*	Cr.	£	*s.*	*d.*
To Postages of Reports, &c., to Subscribers last year	0	3	6	By Balance from last year	1	18	0
1858.				1858.			
To Circulars calling Public Meeting	0	8	0	By 4 Subscribers at 10*s.* each	2	0	0
" Postages	1	7	6	" 35 Ditto, at 5*s.* each	8	15	0
" Mrs. Johnson	0	2	6	" 36 Ditto, at 2*s.* 6*d.* each	4	10	0
" Mr. Turner	0	2	6				
" Expense of Deputation to London	13	1	0				
" Balance in hand	1	18	0				
	£17	3	0		£17	3	0

Examined and found correct, RICHARD BIRD, J. DAKIN, } *Auditors.*

Mr. ABRAHAM proposed a vote of thanks to the several gentlemen who had leetured for the Soeiety during the past Session, and also to the Donors to the Library and Museum.

The motion was seconded by Mr. ARNOTT, and earried with aeelamation.

Moved by the PRESIDENT, seeonded by Dr. EDWARDS, and earried unanimously,

"That a vote of thanks be presented to Mr. Walker, for his serviees as Librarian to the Association."

The meeting then proceeded to fill up the vacancies in the Council caused by the

retirement by rotation of Messrs. H. S. Evans, E. Evans, R. R. Jackson, and N. Mercer; when, upon the votes being counted by the Secretary, Messrs. H. S. Evans, N. Mercer. G. Barber, and J. Dutton were declared duly elected.

Mr. Abraham moved the thanks of the meeting to the President, Treasurer, and Secretary. He was sure they were much indebted to all these gentlemen for the manner in which they had performed their duty.

The motion was carried by acclamation.

Dr. Edwards begged permission to show some very beautiful and valuable metals prepared by Dr. Matthieson, of London, and kindly lent to him. Such a collection had probably not been seen before in Liverpool. In the form of crystals were sodium and potassium, the base of the alkalies. Lithium in wire—a metal only half the weight of water—magnesium and calcium in wire, and many rare metals, such as tellurium, barium, selenium, &c. The whole collection appeared to excite great interest. Dr. Edwards showed the combustion of magnesium wire, which was very brilliant. The proceedings then terminated.

CHEMICAL DISCUSSION SOCIETY.

A Society has just been formed, with the above name, which is intended to occupy, with reference to Chemistry, a somewhat similar position to that which the Phytological Society holds in reference to Botany. The new Society will consist principally of junior members of the Pharmaceutical body, and it is intended that the meetings should be held, with the permission of the Council, in the house of the Pharmaceutical Society. The objects of the Society are explained in the following constitution and rules:—

CONSTITUTION.

The Chemical Discussion Society has been established for the purpose of promoting the study of Chemistry and the Allied Sciences among the younger Members of the Pharmaceutical Profession, by affording opportunities for the discussion of subjects to be introduced at periodical meetings, by the reading of papers, or by verbal communications, and tending to the mutual scientific improvement of the Members.

RULES.

I. The management of the Society shall devolve upon a President, who shall be elected annually, and upon a Committee of eight Members; four of whom shall retire annually, but shall be eligible for re-election. Three shall be a quorum. The Committee shall fill up vacancies that may occur in its number.

II. The Committee shall elect from among themselves a Treasurer and Secretary, who shall remain *ex officio* Members of the Committee.

III. In the absence of the President, one of the Committee shall take the chair. Upon all questions of order the decision of the Chairman shall be final.

IV. No paper shall be read, nor any subject introduced at the Meetings, against the wish of the Committee.

V. The ordinary proceedings of the Society shall not be published in any journal, but the Annual and other Reports of the Committee may be so published.

VI. Copies of papers read at the Meetings shall be given into the charge of the Secretary, to be kept for reference; but the Society shall exercise no right over such papers or communications.

VII. Every Candidate for admission into the Society shall be proposed by a Member at an Ordinay Meeting, and at the following Meeting shall be balloted for. A majority of votes to decide. After he has been elected he shall sign the following obligation, to be kept by the Secretary, and pay his subscription for the current year, upon which he shall be admitted a Member of the Society.

Obligation.

I, the undersigned, having been elected a Member of the Chemical Discussion Society, do hereby engage to abide by the Rules and support the Constitution of the said Society, so long as I continue a Member thereof.

VIII. Every Member shall pay an annual subscription of five shillings, such subscription becoming due on the first day of January in each year.

IX. In the case of Members who shall be elected after the month of October, and who shall have paid their subscription, such subscription shall count for the year next ensuing.

X. Persons not belonging to the Pharmaceutical body, but whose co-operation would be valuable to the Society, shall be eligible as Members.

XI. Any Member desiring to withdraw from the Society, shall signify the same in writing to the Secretary. Any Member whose subscription is in arrears for three years, may be removed by the Committee from the list of Members.

XII. To expel any Member from the Society for other cause than non-payment of subscription, it shall be necessary for the Committee to summon a Special General Meeting, of which one month's notice shall be given to every Member of the Society; and the proposition for such expulsion being made at such Meeting, and submitted to a ballot, if three-fourths of the Members assembled vote in the affirmative, the proposition shall be carried.

XIII. A Meeting of Members shall be summoned annually in the month of January, to receive the Report of the Committee and the Treasurer's accounts, and to elect the President and four Members of Committee for the ensuing year. The election shall be by ballot. Members of the late Committee shall be eligible for re-election.

XIV. At the Ordinary Meeting in the month of December, two Members not belonging to the Committee shall be appointed Auditors, to examine the Treasurer's accounts for the Annual Meeting.

XV. The foregoing Rules of the Society shall not be altered or increased without the sanction of a Special General Meeting of the Members. The Committee may, however, make such Minutes for carrying out the objects of the Society as may from time to time be found necessary.

The Meetings will be held on the first Monday in the months of November, December, February, March, April, May, June, and July, at eight P.M.

ORIGINAL AND EXTRACTED ARTICLES.

OBSERVATIONS OF BOYLE GODFREY, M.D.

COMMUNICATED BY MR. JOSEPH INCE.

The following Observations are chiefly selected from a compilation entitled "Miscellanea vere Utilia," which has been long since out of date. They are curious, if not instructive, and form an illustration of the style of thought that prevailed about a century ago.

I.

The proper ways of feeding our bodies seem as little known to the generality of mankind as the reasons for the effects of the magnet; at least we do not see persons practise them; and indeed there is nothing more difficult than to persuade persons to a regard of anything said on this subject, so great is the desire of gratifying the itch of the palate. Many great physicians have laid down admirable rules for regimen, all which seem to lie neglected; and indeed I cannot say I conceive great hopes of rousing up persons to an attention to matters of this kind by the few things I shall deliver. However, I cannot be easy till I have attempted it, and will not yet give up all hopes of success.

II.

I am confirmed in the opinion that our bodies are designed for an hundred years, and that if we fall short of that age, it is in great part our own faults, we erring either in the quantity or quality of the aliments we make use of (not that I would be understood to mean that we are not subject to diseases, the nice frame of the animal economy certainly renders us obnoxious thereto) and much further than this age, life cannot run, because ossifications will not let us; that is, the grand channels of our blood, the arteries, as well as the other parts serving to the vital functions, will turn to bones, whence the machine stands still; and this happens the sooner, when the person has been of a laborious life.

III.

Cheese toasted becomes like leather, and indigestible; it were to be wished cheese were used more sparingly, for the saying, Caseus est bonus quem dat manus avara, is true. The Cheshire is corrosive, for it will excoriate the mouth.

IV.

I am for considering teas, likewise coffee and chocolate, in a natural state, and without analysing or taking them to pieces; for upon doing that, we find principles or substances that do not affect us before they are separated by art: for example, upon a chemical examination of tea, coffee or chocolate, we obtain a sharp vinegar-like spirit, &c., which in a natural state is latent or unperceived; and, as said above, don't affect us as such. Thus bread doubtless is good for all; but if we take it to pieces by a chemical process, we get a hot oil, and a sharp acid spirit, neither of which, perhaps, would agree with us; therefore I say, I shall not trouble my readers with the principles or latent component parts of them. The Green and Bohea, I agree with others, to be one species of herbs, the latter of which is now adulterated, and chiefly by a solution of Japan-earth, and sometimes by a worse way. This herb has in it a very pungent and even corrosive essential salt; but as to a fixed lixivial one, as a late writer asserts, it is a mistake; for there is no fixed salt pre-existent to calcination, such salts are made during calcination by the acid of the vegetable preying on its own terra, or earth, and thereby forming a salt; and which salt being kept in the glass-house fire, the acid is driven off and you have the terra. We may also take away this acid part by a certain process with sulphur.

If strong tea be held in the mouth, a diligent observer will perceive an uneasiness, for it begins to stimulate the membrane or skin of the mouth. Strong tea will corrode or gnaw flesh; it will also corrode iron. Kæmpher, in his appendix to the history of Japan, says, that it has a strong narcotic quality (that is, of the nature of opium), and that it is unwholesome till kept a year. We know examples of people who were great drinkers of strong tea, who died thereby, and who being opened, their stomachs were found ulcerated. I am confirmed by observations and experiments, that a too free use of tea made strong is very pernicious. Its essential salt spoils the texture of the nervous fluid, called the animal spirits. It coagulates the blood, and impedes its free circulation. It is an error to think it raises our spirits; it is only the effects of the hot water. Hot water and straw will do the same, which holds but a little while, and then the drinker almost trembles.

Our own country produces about eighteen hundred simples, out of which we may pick very pretty teas, without sailing to Turkey, the East and West Indies, for a breakfast, as we do for this herb, coffee and chocolate, for the first of which we send coin. Those who are resolved to use it, let them make it small, and add thereto some milk, which by its butyrous part, takes off in some measure its sting; but they will do much better, to use instead thereof an infusion of ground ivy, baum, sage, or coltsfoot. I am of opinion that most of the modern illnesses and lowness of spirits arise from the abuse of tea, and the use of those deadly doses, drams; in which I have the concurring sentiments of several of our learned physicians.

[*Note.*—A speaker at one of our modern meetings was insisting on the baneful effects of tea, and finished an eloquent oration by observing that it was a slow poison. "Very slow," replied an old gentleman of eighty; "I have taken it for more than seventy years, and it has not killed me yet."]

V.

The things I have yet to mention that ought to be cautiously used or avoided, are spirituous or strong liquors, touching which, persons err more than in all things else in the world. I say I know of nothing that the generality are under so great a mistake about as strong liquors, and there is no convincing them of the rock that they are about to split upon. They are accounted our comforts, our support, and strength, whereas they are our bane and destruction, and introduce everything into the animal economy destructive of its functions. There is a latent acid in ardent or burning spirits, besides the fiery part, which is the merry-making or intoxicating quality in all strong liquors, and which is a bitter enemy to the springs of life. Those held highest in esteem are the

French wines, which in truth is the curse of that fine country; for all of them (except that called Muscat or Muscadine), and especially the Burgundy, are their bane, and the bane of many here; for they abound with a cruel tartar, indissoluble to our fluids, from their acid being closely combined with their own terra or earth, which tartar subjects the people of the country to the gout, vertigos, all the kinds of hæmorrhages or effusions of blood, the gravel, and stone. Of the nature of those wines also are the Rhenish and Gallician, and to be avoided alike. If a man is firmly resolved to go on in the use of wine, let him use red port. Of many evils, he then chooses the least.

VI.

Drams.—I cannot mention these doses without pain. They are the most deadly of all liquors, and which continue in use, notwithstanding the last prohibition. Drams are near as sure death as a sword, though a little slower about the work. The most dangerous is that called usquebaugh, which, if made by the finest receipt, is loaded with saffron, besides other hot ingredients; which saffron, in the hands of a physician, is of great use in medicine, but if used too freely is a fire, for it will raise blisters and corrode; and I know a preparation of it stronger than any of the burning caustics surgeons use, and more violent to the flesh than boiling oil. Brandy and rum are the most hurtful, in respect of the great quantity of ardent spirit they contain; and compound drams, in respect of the hot ætherial oils they receive from the ingredients they are composed of. In a gallon of brandy there is about two quarts and a pint of spirit; in five quarts of a made dram, there is but two quarts of spirit. Geneva, so much esteemed by the vulgar, is indeed a vulgar compound, being the product of 30 gallons of water and 10 gallons of spirit, such as we burn in lamps, with a quart of oil of turpentine distilled together. It is an error to think the Hollanders can make this liquor better than we; theirs generally being done of French brandy, which they have cheaper, and we using common malt spirits, occasions the difference. But give the English operator brandy, and he will outdo the Dutchman; for distillation, or the manner of compounding, is much better known here than abroad.

VII.

At dinner let plain things be eaten, and let them be dressed rather by a cook of six pounds a year, than sixty.

VIII.

Speaking here of health, I would add one more caution, though of a different kind, viz., not to suffer children to be swung in a swing by the neck to make it longer, as is the present custom; for I have known mischief ensue from it twice, when one child got a tumour on the chest, and another fell into strong twitchings, as if convulsed.

IX.

Physicians are apprised of what little value Bezoar Stone is; but the good wives and nurses yet continue its use, notwithstanding they give an ounce and half of gold for an ounce of it. I am convinced it is a whim, for which we may use Crabs' Eyes mixed with a very little grated nutmeg. The renowned professor Boerhaave says of it, Laudatur quia pretiosus. Upon this drug I intend further experiments.

[Bezoar denotes an antidote, from a Persian word, and is generally applied to medicinal stones generated in the stomach and other viscera of animals. Bezoars usually attain the size of acorns or pigeon's eggs, the larger the more valuable. A stone of one ounce was sold in India for one hundred livres, and one of four ounces and a quarter for two thousand: they were very scarce, and few of the genuine ever came into the European market, the greater number that were sold being artificial compounds. The Hog Bezoar, or Pedra del Porco, was first brought into Europe by the Portuguese: it is found in the gall bladder of a boar in the East Indies: the Indians attribute infinite virtues to it, as a preservative against poison, cholera, &c. The porcupine and monkey Bezoars were

held in such esteem by the natives of Malacca, that they never parted with them unless as presents to ambassadors and princes; single stones have been sold for sixty or eighty pounds sterling. In 1715 Bezoar was thought equal in value to gold. Dr. Patin says of it, the most visible operation it hath is when the bill is paid; and he calls it the scandalous stone of offence and lasting monument of perseverance in imposture.—*Sketches of Imposture.* Tegg. Page 346.]

X.

It is asserted by most that Ants afford an acid spirit in distillation, and that being infused in water, they communicate a sourness thereto, so that the infusion will effervesce with alcalis; whence they conclude this animal to differ from all others, the rest of the creatures all giving an alcalious spirit: but if this matter be better examined into, we shall find that this acidity is not a part of the animal, or one of the principles of which he consists, but proceeds from what he carries on his thighs and legs, a vegetable production; and that if this creature be cleared of that adhering matter, and then distilled, &c., an alcalious spirit will be obtained, as from other animals.

XI.

The process of making the precipitate *per se* being very tedious, and I hearing a French physician say, that it might be done by frequently distilling the crude mercury, I put mercury into a retort, and distilled it up many times, when it came up as fluid the last time as the first; whence I found the French gentleman had not worked thereon himself; and that there is no other way but by giving it time, and dividing it by pebble-stones.

XII.

A man at Rotterdam went into a druggist's shop, where he called for half a pint of oil of turpentine, and desired the shopkeeper to lend him a glass, which having received, and put the oil thereinto, he drank half of it and went away, desiring him to let it stand a little; and returning in half an hour, drank the rest; after which doses he was frequently seen in the streets, which was a surprise to the physicians, and indeed to myself. It was not known whether he went and drank water. Since I came to England I mentioned this to an eminent physician, who acquainted me that he knew half a pound drank by a man, who was only strongly purged thereby.

XIII.

A man brought a certain mixture to a chemist, in London, which he desired to have distilled, which the servant in the absence of the master took in to work upon, which he having set a doing according to the orders he had received, went down to dinner; in the meantime the mixture blew up with a terrible noise, breaking the vessels, and was almost like to blow the chimney down, which the master of the laboratory coming to be acquainted with, enquired of the person that brought it what it might be, who answered, that it was a mixture of honey and nitre. So that though nitre alone is not inflammable, yet the sulphur or phlogistic part of the honey had afforded fuel to it, whence a kind of gunpowder was formed. This is inserted, to guard others against working on the like subjects, in the same manner.

XIV.

Crude sulphur and quick lime being mixed together in about equal parts, and put into a vessel, and covered with earth, will in no long time afterwards burst out into a flame and fling up the earth. This I had of a German physician; I have not tried it. May we not hence account for volcanos and earthquakes?

XV.

Peruvian Bark.—This is a part of the Materia Medica that is extremely necessary, but much adulterated, especially for the use of the country (for there goes a cant word, *Country Goods*), whither there goes many hundred-weight of oak bark dyed in the dyers' dye-pot.

XVI.

It is generally complained by watchmakers, that in cold weather the oil

congeals in the works, and obstructs the motions; to remedy which proceed thus: Look into a jar of salad oil in winter, when it is frozen or congealed, and there will be found in the middle of it about a pint and a half, or a quart of oil that is fluid or uncongealed, and which no cold in this climate is capable of freezing, which may serve for the purpose for watchmakers. When salad oil is designed to be used, as in the experiment about the jar, the artificers ought to desire merchants to get their correspondents to send the oil over hither unmixed with salt; for they usually mix salt with it to make it keep, which salt by its acrimonious parts corrodes their machines, and does them injury that way.

XVII.

The process by which Longueville imitated gold, for which the Dutch boiled him alive in oil, was this:—Take copper, four ounces; calcine it with common sulphur till it comes to an ounce and quarter, which must be done by several red-hot makings; and when it becomes green, it is enough. Then take this calcined copper and an ounce of silver, and half an ounce of borax; melt them very well together, then cast it out of the crucible and beat off the dross, and melt it again with as much borax; cast it out again, and beat off the dross as before, repeating this work a third time; then melt again by itself in a strong fire, adding thereto two ounces of gold; let it stand awhile in flux, add some borax to it, and keep it there an hour; then cast it out into ingots, repeating the fluxing till the borax remains white; then melt this artificial gold alone, and cast it into grains of nitre, till it has got a good large skin on the top of it, then cast it into ingots, and it is done. So far the receipt, as communicated to me by a German professor of an university.

What faults this man committed in his time I know not, but I regret his death, if it was for gold-making; for I think this process far from that. However, be it as it will, a friend of mine knows a gentleman who saw Longueville cast down a hollow wooden thing into a cauldron of boiling oil, when he stood so nigh it, that some of the oil flew on his clothes.

31, *Southampton Street, Covent Garden.*

REPORT OF THE

RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION,

AND OF THE

APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

BY B. H. PAUL, Ph.D.

(*Continued from p.* 234.)

Quantitative Estimation of Sugar.—The fact that in the fermentation of sugar other substances besides alcohol are produced, renders the accuracy of the fermentation method of estimating sugar very questionable. Professor Fehling,* therefore, recommends the use of a solution of copper as the most trustworthy. The objection that other substances besides sugar produce the same reduction he believes may be provided against by precipitating these substances beforehand with basic acetate of lead. He has found that, in this way, normal urine mixed with 10 or 20 per cent. of grape sugar always indicates the amount of sugar actually present.

He also points out that the condition of the copper solution is of importance. It must have a definite composition, and must not be decomposed by boiling. This solution is to be prepared with crystallized seignette salt, and must be kept from the air. When used, this solution should be made very alkaline, and heated to the boiling point before adding the saccharine solution, ebullition being kept up until the whole has been added.

Production of Cyanogen.—M. Langlois† has made some experiments for the purpose of ascertaining whether the presence of water vapour has any influence on the production of cyanogen when nitrogen is passed over a red-hot mixture of carbon and carbonate of potash.

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* *Annalen der Chemie und Pharmacie*, cvi., 75. † *Ibid.*, March, 1858.

It is known that cyanide of potassium may be produced from atmospheric nitrogen. The fact was first observed by Desfosse, and Mr. Lewis Thompson found that a mixture of potash with coke and iron filings, heated to redness in the air, yielded a certain amount of cyanide of potassium. Subsequently, Mr. Fownes showed that the cyanide thus produced is not due to the nitrogen of the carbon as had been suggested by Berzelius.

About the same time, M. Langlois showed that cyanide of ammonium is produced when dry ammonia is passed over intensely heated carbon. Erdmann and Marchand repeated the experiments made by Mr. Fownes, and came to the conclusion that no cyanogen was produced when dry nitrogen was used. Berzelius pointed out, with regard to this result, that it quite agreed with experiments made by Wöhler, who showed that cyanide of potassium is always produced when the nitrogen is moist, or when the potash contains water. In accordance with these facts, Berzelius regarded it as probable that the presence of water might be necessary for the production of ammonia, and that the cyanogen was produced from this substance.

In opposition to this view, Mr. Newton obtained a patent, in 1843, for preparing cyanide of potassium on the large scale, by igniting a mixture of carbonate of potash and carbon in a current of nitrogen. Possez and Bobierre erected a factory for producing ferrocyanide of potassium by means of the nitrogen of the air, and they state that the presence of a small proportion of water in the mixture of carbon and alkali prevented the production of cyanide of potassium, or decomposed that which was produced.

These contradictory opinions induced M. Langlois to make further experiments under conditions in which there is no doubt as to the production of cyanogen—namely, using hydrate of potash and moist nitrogen.

The apparatus used for the purpose consisted of a tube with a series of globes partly filled with water, and a tube of green glass fifteen centimetres long, filled with copper turnings and fitted into a furnace. Lastly, a porcelain tube, filled with a mixture of caustic potash and carbon, fitted into a wind furnace, and connected with an aspirator by means of a caoutchouc tube.

After the aspirator was filled with water, the porcelain tube was heated to redness, and the tube containing the copper turnings was heated to the same temperature. A current of air was then set up by opening the cocks of the aspirator. This air was saturated with moisture by passing through the bulbs containing water, then deprived of its oxygen by passing over the copper turnings, while the nitrogen passed on to the ignited mixture of carbon and hydrate of potash. Cyanogen was copiously produced.

Another experiment was made with the bulbs filled with sulphuric acid in the place of water, and, so as to render the nitrogen anhydrous, the air was passed through the tubes filled with chloride of calcium, one being inserted between the aspirator and the porcelain tube containing the mixture. In this instance also cyanogen was produced, although every precaution was taken to prevent access of water.

This was always the case when porcelain tubes were used, but when glazed earthenware tubes were used, no more cyanide was obtained either with dry or moist nitrogen. This result is ascribed by M. Langlois to the fact that the glazed tube contains oxide of lead, which decomposes the cyanide as it is produced. This opinion was confirmed by heating a mixture of hydrate of potash and carbon with cyanide of potassium in earthen-glazed tubes, when it was found that the cyanide was decomposed. Hence the results obtained by Erdmann and Marchand are to be ascribed to some such circumstances, and there is no doubt that cyanogen may be produced by the direct combination of carbon with dry or moist nitrogen in the presence of bases.

Use of Zinc Blende in Glass-making.—Dr. R. Wagner* states that zinc blende may be substituted for oxide of zinc in the preparation of zinc glass. He proposes the following proportions :—

Sulphate of soda	213.0
Zinc blende.....	48.6
Sand	205.1

* *Polytechn. Journ.*, cxlviii., 447.

The reaction that takes place in melting this charge, is—

Sulphide of zinc, Zn S	48.6	=	Oxide of zinc, Zn O	40.6
Sulphate of soda, 3 NaO, SO_3...	213.0		Soda, 3 NaO	93.0
			Sulphurous acid, 4 SO_2 ...	128.0
	261.6			261.6

The sulphurous acid is disengaged, and the oxide of zinc and soda enter into combination with silica.

Probably the zinc blende may be used as a substitute for litharge in the glazing of pottery.

Lactic Acid.—The composition of ordinary lactic acid is represented, according to Gerhardt's view, by the formula $C_{12}\ H_{12}\ O_{12}$. Strecker* has more recently expressed the opinion that the lactic acid of flesh is $C_6\ H_6\ O_6$, while ordinary lactic acid is $C_{12}\ H_{12}\ O_{12}$.

Wurtz has come to the conclusion that the constitution of ordinary lactic acid is to be represented by the formula—

$$\left.\begin{matrix} C_6\ H_4\ O_2 \\ H_2 \end{matrix}\right\} O_4,$$

and consequently that it is one of the most simple organic acids. He prepared lactic acid from propyl-glycol, $C_6\ H_8\ O_4$, by slow oxidation, by means of platinum black. The reaction corresponds to the production of acetic acid from alcohol :—

$$C_4\ H_6\ O_2 + O_4 = C_4\ H_4\ O_4 + 2\ HO\ ;$$
$$C_6\ H_8\ O_4 + O_4 = C_6\ H_6\ O_6 + 2\ HO\ ;$$

but it may give rise to the production of glycolic and carbonic acids, instead of lactic acid.

The dry zinc salt of the lactic acid thus obtained, gave on analysis numbers corresponding with the formula—

$$\left.\begin{matrix} C_6\ H_4\ O_2 \\ Zn\ H \end{matrix}\right\} O_4.$$

Carbon.....	29.4 per cent.
Hydrogen	4.1 "

The air-dried salt lost at 100° C. about 18.1 per cent. of water. Its characters and composition were the same as those of ordinary lactate of zinc, $C_6\ H_5\ Zn\ O_6 + 3\ HO$.

The monatomic radical in alcohol is converted into acetyl by the introduction of O_4, and the diatomic radical, $C_6\ H_6$, is converted into lactyl, $C_6\ H_4\ O_2$, by the introduction of O_4.

Chloride of Lactyl, $C_6\ H_4\ O_2,\ Cl_2$, obtained when lactate of lime is distilled with chloride of phosphorus. It is a colourless liquid, which readily blackens and evolves hydrochloric acid. By contact with water it is converted into lactic and hydrochloric acid.

Chlorolactate of Ethyle, $\left.\begin{matrix} C_6\ H_4\ O_2 \\ C_4\ H_5\ Cl \end{matrix}\right\} O_2$, has an agreeable aromatic smell. Boils at 150° C.; density, 1.097 ; vapour density, 4.9. It is produced by the reaction of chloride of lactyl with alcohol and chloride of phosphorus.

The acid contained in this substance may be represented by the formula—

$$\left.\begin{matrix} C_6\ H_4\ O_2 \\ H_2 \end{matrix}\right\} O_4 + H\ Cl = \left.\begin{matrix} C_6\ H_4\ O_2 \\ H,\ Cl \end{matrix}\right\} O_2 + H_2\ O_2.$$

So that here and in the corresponding ether, the group HO_2 seems to be replaced by chlorine, and the vapour density shows that the chlorinated ether derived from chloride of lactyl, contains six and not twelve atoms of carbon. Then, since chloride of lactyl gives with water hydrochloric acid and lactic acid, and since this chloride contains the radical, $C_6\ H_4\ O_2$, lactic acid must also contain this biatomic radical, and H_2 replaceable by metals.

$$\left.\begin{matrix} C_6\ H_4\ O_2 \\ Cl_2 \end{matrix}\right\} + \left.\begin{matrix} H_2 \\ H_2 \end{matrix}\right\} O_4 = \overset{\text{Lactic acid.}}{\left.\begin{matrix} C_6\ H_4\ O_2 \\ H\ H \end{matrix}\right\}} O_4 + H_2\ Cl_2.$$

M. Würtz† has also obtained a homologue of lactic acid, by the action of nitric acid upon amyl-glycol. This he calls

Butyl-lactic Acid, $\left.\begin{matrix} C_8\ H_6\ O_2 \\ H_2 \end{matrix}\right\} O_4$.—The baryta salt is not crystallizable, very

* *Comptes Rendus*, xlvi., 1228. † *Ibid.*, xlvi., 1232.

soluble in water, insoluble in absolute alcohol. The zinc salt crystallizes in shining laminæ, containing 2 equivalents of water. It dissolves in 160 parts of cold water, and is almost insoluble in alcohol.

The production of this acid, corresponding to butyl-glycol, from amyl-glycol, is due to the energetic action of nitric acid upon this substance, and the oxidation of $C_2 H_2$.

The known members of the lactic acid series are, therefore—

$\left.\begin{matrix} C_4 H_2 O_2 \\ H\ H \end{matrix}\right\} O_4$.—Glycolic acid, produced by oxidation of glycol.

$\left.\begin{matrix} C_6 H_4 O_2 \\ H\ H \end{matrix}\right\} O_4$.—Lactic acid, produced by oxidation of propyl-glycol.

$\left.\begin{matrix} C_8 H_6 O_2 \\ H\ H \end{matrix}\right\} O_4$.—Butyl-lactic acid.

All these acids are biatomic, and are produced from biatomic alcohols.

Isomorphism of Fluoride of Silicium and Fluoride of Tin Compounds.—M. Marignac* has been induced by the fact that the vapour density of fluoride of silicium and that of chloride of silicium decidedly favour the opinion that their composition corresponds to the formulæ $Si Fl_2$ and $Si Cl_2$, to ascertain whether further evidence with regard to this point might not be furnished by the crystalline forms of silicium compounds. In this respect silicic acid appears to be unlike all other acids. However, he found that the double salts of fluoride of tin have the greatest resemblance to those of fluoride of silicium, and are undoubtedly isomorphous with them. This isomorphism he considers can only be accounted for by ascribing to the fluoride of silicium the formula $Si Fl_2$, analogous to that of fluoride of tin.

The potassium and ammonium salts do not admit of comparison, because the fluosilicates are anhydrous, while the fluostannates contain one equivalent of water. The sodium salts are anhydrous, and barely soluble in water. The strontium salts of both series contain two equivalents of water, and they are nearly alike as regards solubility. They are perfectly isomorphous, and crystallize as oblique rhombic prisms. The fluostannate of calcium is isomorphous with these two salts, and probably also the fluosilicate of calcium, which was obtained only as microscopic crystals. Both salts contained two equivalents of water, and they are but slightly soluble in water. The zinc salts are very soluble, they both contain six equivalents of water, crystallizing as hexagonal prisms, terminated by a rhombohedron of 127° 16′. The nickel salts also are very soluble, they contain six equivalents of water, and crystallize as hexagonal prisms, terminated by a rhombohedron of 127° 30′. The optical characters of the zinc and nickel salts are the same.

The silver salts of both series contain four equivalents of water, and are deliquescent. The fluostannate crystallizes as square prisms, with four terminal planes at the corners of the prisms. The fluosilicate was obtained as truncated square octahedrons. So far as was possible to determine, these salts are isomorphous.

Protosalts of Iron as Reducing Agents.†—The chlorides of platinum and mercury, as well as iodic acid, though not reduced by sulphate of iron alone, are immediately reduced when caustic alkali is added to the mixture. This affords a convenient mode of preparing platinum black, and the reduction of chloride of mercury affords a mode of estimating mercury.

Chloride of mercury mixed with sulphate of iron, soda, and sulphuric acid, gave subchloride of mercury as a precipitate and a filtrate that did not contain a trace of mercury. Nitrate and sulphate of mercury gave the same result after having been mixed with sufficient chloride of sodium.

Among the more frequent metals there are only silver and gold that require to be looked for, and both would be indicated in the course of the operations.

The clear liquid filtered from a solution of iodic acid mixed with sulphate of iron and soda, gives, when saturated with sulphuric acid and shaken with chloroform, a deep red colour to the latter. In this way, 0.00001 grm. of iodic acid dissolved in 20 cub. cent. water, is distinctly recognizable.

The reactions that take place in this case are the reduction of iodic acid to iodine by the hydrated protoxide of iron, and the production of iodide and iodate by reaction

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* *Comptes Rendus*, xlvi., 854.

† Hempel—*Annalen der Chemie und Pharmacie*, cvii., 97.

with the excess of alkali; then the elimination of the whole of the iodine again on the addition of sulphuric acid.

The method recommended for estimating mercury, is to mix the mercury solution in a capacious stoppered flask, with an excess of sulphate of iron and caustic potash, and then to dissolve the precipitated oxide of iron by dilute sulphuric acid. The precipitate of subchloride of mercury is then allowed to settle, and the clear liquid decanted off and filtered. After well washing the precipitate, the filter is broken, and its contents mixed with the subchloride in the flask. Then a large excess of dilute sulphuric acid is added, together with some permanganate of potash, the flask closed and well shaken for a few minutes. The excess of permanganate is then decomposed by excess of oxalic acid, and the excess estimated by permanganate. Adding together the two quantities of permanganate, estimating the equivalent of oxalic acid solution, and deducting from it the quantity of the oxalic acid solution used, the result is found by calculating for each equivalent of oxalic acid, two equivalents of mercury.

Reaction of Iodide and Bromide of Potassium with the higher Peroxides of Manganese.—While iodide of potassium even in a neutral solution and at the ordinary temperature, mixed with permanganate of potash is decomposed, and in the presence of acid completely converted into iodic acid, permanganate of potash has no action upon a neutral solution of bromide of potassium even at the boiling point. But on the addition of sulphuric acid, the hydrobromic acid is decomposed, though slowly, even at the ordinary temperature, with production of water and elimination of bromine. By the aid of heat, this decomposition is complete, and after boiling the liquid for two minutes, it does not contain any more iodine. This would be an excellent means of detecting the presence of, and estimating bromides, if the small amount of chlorides almost always associated with them could be prevented from interfering.

Detection of Iodine.—The perchloride of iron recommended as a test for iodine,* may be replaced by bichloride of platinum and chloroform. The results thus obtained are more distinct, for the coloration of the chloroform is due not only to the eliminated iodine, but also in part to the admixture of protiodide of platinum, mechanically suspended.

This reagent is especially applicable for detecting iodine in mineral waters, and it may be applied to either acid or neutral solutions; though, on account of the presence of organic substance, it is generally preferable to add hydrochloric acid to the water beforehand.

The reaction with protochloride of palladium is even still more delicate, and in this case the coloration of the chloroform is due solely to the protiodide of palladium, which may be collected at the surface of the chloroform by shaking the liquid gently.

When the liquid to be tested contains sulphuretted hydrogen, the chlorides of palladium or platinum cannot be employed as a test for iodine. In this case the presence of even less than $\frac{1}{30,000}$ of a milligramme of iodine may be detected by the following test:—

The liquid to be tested is placed in a colourless test tube, and mixed with concentrated sulphuric acid, free from oxide of nitrogen, in the proportion of 0.02 cub. cent. for each cubic centimetre. Enough solution of permanganate is then added to make the liquid distinctly red, and to each cubic centimetre is added 0.03 cub. cent. of a cold saturated solution of oxalic acid. The test tube and its contents are then placed in boiling water for two minutes, then cooled with ice, and mixed with $\frac{4}{100}$ its volume of perfectly clear filtered solution of starch in 50 parts of water, and $\frac{1}{100}$ its volume of a freshly prepared solution of iodide of potassium in 40 parts of water. The same quantities of the same reagents are then mixed in a perfectly similar tube with pure water, for the sake of comparison, and both tubes are placed open over a sheet of white paper.

The presence of iodine in this case is indicated by the blue coloration of the liquid immediately or soon after mixing. If the reagents are pure, and the above directions are adhered to, the application of this test to pure water does not give any colour for about two minutes, and the difference between it and water, con-

* *Pharmaceutical Journal.*

taining even a very minute trace of iodine, is distinctly recognizable for an hour at least.

Liquids containing nitric acid cannot be tested at all in this way, and those containing iron only after it has been separated, by adding to the liquid, acidulated with sulphuric acid, permanganate enough to give a sensible colour, then a slight excess of caustic alkali, and filtering.

Great care must be taken to have fresh solution of starch in such experiments, for this is so liable to undergo change, probably in consequence of the presence of albuminous substance, that even after a few hours it becomes blue immediately with acidulated iodide of potassium solution.

The iodide solution may be kept for at least a day, provided the portions remaining in the pipette are not blown out into the bottle, and when the solution containing air is not exposed to direct sunlight.

In applying the test also, the action of direct sunlight must be prevented, at least after the addition of oxalic acid, because under its influence iodic acid is rapidly decomposed by oxalic acid.

Production of Propionic Acid from Carbonic Acid and Sodium Ethyl.—Mr. Wanklyn* has found that when sodium-ethyl is exposed to the action of carbonic acid gas, there is a considerable elevation of temperature, while it was converted into a white amorphous mass, that effervesced with water, and gave off propionic acid when the solution was distilled with sulphuric acid.

The reaction that takes place between the carbonic acid and sodium-ethyl may be represented by the equation—

$$C_2 O_4 + Na\, C_4 H_5 = C_2O_2 \left.\begin{matrix} C_4H_5 \\ Na \end{matrix}\right\} O_2$$

Substances extracted from Arable Land by Rain Water.—Dr. Fraas of Munich has for some time been making experiments to ascertain the nature and quantity of the constituents of soils that are removed by rain water within a given time. The instrument used by him for this purpose is called a lysimeter, and the substances obtained have been analyzed by Hr. Zoeller.† They originate from the rain water that penetrated a square foot of earth, six inches deep, during the summer of 1857, from April to October. Five different portions were analyzed—

No. 1, from cultivated and manured calcareous soil.
No. 2, from cultivated and unmanured clay soil.
No. 3, from uncultivated and unmanured clay soil.
No. 4, from uncultivated and manured clay soil.
No. 5, from cultivated and manured clay soil.

The manure applied to Nos. 1, 4, and 5, consisted, in each instance, of one pound of cattle manure without straw.

The residues left by evaporation were yellowish or blackish brown, and very hygroscopic. They all contained the same constituents with the exception of manganese, which could be detected only in Nos. 3 and 4. The bases were potash, soda, lime, magnesia, and peroxide of iron; the acids, carbonic, silicic, nitric, sulphuric, phosphoric, and chlorine. Besides these substances, there were also organic substance clay and sand.

In none of these residues could the presence of a soluble compound of alumina or of ammonia be recognized. It was only by boiling for a long time with concentrated caustic potash that an ammoniacal reaction became perceptible, and that was probably due to the decomposition of nitrogenous organic substance. There is, however, so large an amount of nitric acid present, that when the residues of evaporation are heated upon platinum foil they deflagrate, and when the solution is heated with sulphuric acid it decolorizes indigo solution.

This nitric acid has most likely originated chiefly from ammonia by oxidation, for although nitric acid may be produced directly by the combination of atmospheric nitrogen with the oxygen condensed by the soil, ammonia would always be oxidized first, and converted into nitrate of ammonia.

However, since the nitric acid in the solution from soils exists in the state of a lime or magnesia salt, this is a further proof of the powerful attraction of the soil

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* *Journal of the Chemical Society.*
† *Annalen der Chemie und Pharmacie*, cvii., 27.

for ammonia. So that while on the one hand the capability of the soils to condense ordinary oxygen and ozonize it may cause the production of nitrate of ammonia, its powerful attraction for ammonia causes the decomposition of the nitrate of ammonia, the base being retained by the soil, while the nitric acid combines with lime or magnesia.

The analyses show that 1,000,000 parts of the water passing through soil six inches deep contained :—

Solid residue dried at 212°...	472.32	254.62	292.64	305.20	291.50
Fixed portion	317.62	176.74	194.75	214.50	212.16
Potash	6.50	2.37	2.03	5.46	3.82
Soda	7.11	5.60	7.43	23.74	6.02
Lime.....	145.86	57.60	70.80	68.41	92.34
Magnesia	20.52	8.88	1.32	2.93	5.12
Peroxide of iron	1.32	6.35	8.26	5.76	4.30
Chlorine	57.49	9.52	20.87	39.46	35.27
Phosphoric acid	2.23	—	—	—	—
Sulphuric acid.....	17.47	27.13	27.82	29.30	33.49
Silica (soluble)	10.46	11.35	17.46	9.50	9.34

These analyses illustrated the absorptive power of soils, first pointed out by Mr. Way as so important in its influence upon the nutrition of plants. With one exception only, neither phosphoric acid nor ammonia were present in sensible amount; the quantity of potash is in all instances small, and principally referable to the organic substance in the solution. Chlorine, sulphuric acid, and nitric acid salts are not retained by the soil.

If these analyses show the substances that are dissolved from the soil, the opinion that plants derive their nutriment from solutions must be given up. The soils experimented upon gave good crops of corn and straw, and the quantities of potash and phosphoric acid required by these crops much exceed those which would be furnished by solutions of the above composition. Moreover, the comparison of the ash of cereals and the substance dissolved from the soil is inconsistent with the opinion that the food of plants is supplied in solution, unless they are supposed to possess a very considerable selective power.

REPORT ON VEGETABLE PARCHMENT.

BY A. W. HOFMANN, LL.D. F.R.S.,
Professor of Chemistry to the Government School of Mines.

Addressed to Messrs. Thomas De la Rue and Co.

(*Communicated by the Author.*)

Royal College of Chemistry, *August* 12, 1858.

Gentlemen,—In accordance with your request, I have carefully examined the new material, called vegetable parchment, or parchment paper, which you have submitted to me for experiment, and I now beg to communicate to you the results at which I have arrived.

I may here state that the article in question is by no means new to me ; I became acquainted with this remarkable production very soon after Mr. W. E. Gaine had made known his results, and I have now specimens before me which came into my possession as early as 1854. My attention was again called to the subject in 1857, when my friend, Mr. Barlow, delivered an interesting discourse upon vegetable parchment, at one of the Friday evening meetings of the Royal Institution.* Hitherto, however, I had not myself experimented upon the subject.

The substance submitted to me for examination exhibits in most of its properties so close an analogy with animal membrane, that the name adopted for the new material seems fully justified. In its appearance, vegetable parchment greatly resembles animal parchment; the same peculiar tint, the same degree of translucency, the same transition from the fibrous to the hornlike condition. Vegetable, like animal parchment, possesses a high degree of cohesion, bearing frequently repeated bending and rebending, without showing any tendency to break in the folds ; like the latter, it is highly hygroscopic, acquiring by the absorption of moisture increased flexibility

* On some Modifications of Woody Fibre, and their Applications, by the Rev. J. Barlow, M.A., F.R.S., &c.—*Proceedings of the Royal Institution of Great Britain.*

and toughness. Immersed in water, vegetable parchment exhibits all the characters of animal membrane, becoming soft and slippery by the action of water, without, however, losing in any way its strength. Water does not percolate through vegetable parchment, although it slowly traverses this substance like animal membrane by endosmotic action.

In converting unsized paper into vegetable parchment or parchment paper by the process recommended by Mr. Gaine, viz., immersion for a few seconds into oil of vitriol, diluted with half its volume of water, I was struck by the observation, how narrow are the limits of dilution, between which the experiment is attended with success. By using an acid containing a trifle more of water than the proportion indicated, the resulting parchment is exceedingly imperfect; whilst too concentrated an acid either dissolves or chars the paper. Time, also, and temperature are very important elements in the successful execution of the process. If the acid bath be only slightly warmer than the common temperature, 60° F. (15.5° C.)—such as may happen when the mixture of acid and water has not been allowed sufficiently to cool—the effect is very considerably modified. Nor do the relations usually observed between time, temperature, and concentration, appear to obtain with reference to this process; for an acid of inferior strength, when heated above the common temperature, or allowed to act for a longer time, entirely fails to produce the desired result. Altogether the transformation of ordinary paper into vegetable parchment is an operation of considerable delicacy, requiring a great deal of practice; in fact, it was not until repeated failures had pointed out to me the several conditions involved in this reaction, that I succeeded in producing papers in any way similar to those which you have submitted to me for experiment.

Mr. Barlow, in the discourse on woody fibre to which I have alluded, records some experiments establishing that unsized paper, by its conversion into vegetable parchment, receives no appreciable increase of weight. These experiments rendered it very probable that the action of sulphuric acid in this case is essentially molecular, and that the chemical composition of the substance of the paper by its conversion into parchment is not altered. It remained to establish this point experimentally. For this purpose several of the specimens of commercial vegetable parchment, without any further purification, were submitted to analysis. The result showed that—with the exception of about 0.9 per cent. of mineral matter, a quantity, not much exceeding the amount which is present in the better varieties of ordinary paper—the substance of vegetable parchment *is identical in composition with cellulose or woody fibre.* The analytical experiment demonstrates—as might have been expected—that the extraordinary change which the properties of paper undergo during its transformation, depends solely and exclusively upon a molecular rearrangement of the constituents, and not upon any alteration in the composition of the paper. In this respect the action which sulphuric acid exerts upon woody fibre may be compared to the transformation of woody fibre, under the protracted influence of the same agent, into *Dextrin*, a substance altogether different from fibre, but still identical with it in composition. Vegetable parchment may in fact be looked upon as the connecting link between cellulose on the one hand, and dextrin on the other.

Thus it is obvious that the transformation, under the influence of sulphuric acid, of paper into vegetable parchment, is altogether different from the changes which vegetable fibre suffers by the action of nitric acid; the cellulose receiving, during its transition into *pyroxylin* and *gun-cotton*, the elements of hyponitric acid in exchange for hydrogen, whereby its weight is raised, in some cases by forty, in others by as much as sixty per cent. As the nitro-compounds thus produced differ so essentially in composition from the original cellulose, we are not surprised to find them also endowed with properties altogether different; such as, increased combustibility, change of electrical condition, altered deportment with solvents, &c., whilst vegetable parchment, being the result of a molecular transposition only, in which the paper has lost nothing and gained nothing, retains all the leading characters of vegetable fibre, exhibiting only certain modifications which confer additional value upon the original substance.

The nature of the reaction which gives rise to the formation of vegetable parchment having been satisfactorily established, it became a matter of importance to ascertain whether the processes used for the mechanical removal of sulphuric acid from the paper had been sufficient to produce the desired effect. It is obvious that the valuable properties acquired by paper, by its conversion into vegetable parch-

ment, can be permanently secured only by the entire absence or perfect neutralization of the agent which produced them. The presence of even traces of *free* sulphuric acid in the paper would rapidly loosen its texture, the paper would gradually fall to pieces, and one of the most important applications which suggest themselves, viz., the use of vegetable parchment in the place of animal parchment for legal documents, would thus at once be lost.

Examination of the vegetable parchment for free sulphuric acid was therefore one of the principal points to which I had to direct my attention. From the description of the process adopted in preparing the new material, viz., long continued mechanical washing with cold water, immersion in a dilute solution of caustic ammonia, and, lastly, renewed washing with water, the absence in it of free sulphuric acid may be at once inferred on scientific grounds. For supposing that the first process of washing had left any free sulphuric acid in the paper, this acid, after immersion of the paper in caustic ammonia, for which it has so strong an attraction, could have remained only in the form of sulphate of ammonia, a salt of perfectly neutral composition, in which the acid character of sulphuric acid is entirely lost. Now, sulphate of ammonia is a most stable compound, which begins to decompose only at about 536° F. (280° C.), a temperature at which paper is completely destroyed; and even then, no free sulphuric acid is to be found amongst the products of decomposition. But the paper is washed again after treatment with ammonia, and, obviously, only traces of sulphate of ammonia can remain in it.

The absence of free sulphuric acid in the parchment paper was, moreover, established by direct experiment. The most delicate test papers, left for hours in contact with moistened vegetable parchment, did not exhibit the slightest change of colour. Several square feet of parchment paper were cut up into small pieces and boiled for half a day with water; the liquid was filtered off, and the solution concentrated to a few drops. The liquid thus obtained was found to contain sulphate of lime and sulphate of ammonia, and slightly reddened blue litmus-paper, in consequence of the presence of the sulphate of ammonia, which, though neutral of composition, like so many other neutral salts, affects vegetable colours. In fact, on dissolving pure sulphate of ammonia which had been crystallized, from a solution purposely rendered alkaline by the addition of ammonia, a solution was obtained, exhibiting even a greater effect upon blue litmus-paper. The absence of free sulphuric acid in this liquid was, moreover, directly proved, for paper moistened with this concentrated liquid and dried at 212° F. (100° C.), exhibited no kind of disintegration, the liquid producing, in fact, not more effect upon paper than common water. This experiment appears to me conclusive; for supposing even an extremely minute quantity of free sulphuric acid in the vegetable parchment, it is obvious that, by withdrawing this acid from a considerable quantity of paper, and concentrating its action upon a single strip at as high a temperature as that of boiling water, a very perceptible effect of disintegration would have resulted.

From the above considerations and experiments, I conclude that vegetable parchment, as prepared by the process which you describe in your letter, and as represented by the samples accompanying it, *does not contain a trace of free sulphuric acid.* I conclude, moreover, that the sulphates, of which minute quantities are present in this as in almost every variety of paper, *cannot possibly develop free sulphuric acid* by any influences, to which the vegetable parchment is likely to become exposed. There is no reason, therefore, to believe that vegetable parchment, prepared, as it is, by one of the most powerful agents of decomposition, carries within itself the germ of its own destruction.

In addition to the experimental evidence already adduced, it may be stated that if such were the case, a change would become perceptible after a comparatively limited period; but specimens of vegetable parchment which have been in my possession for upwards of four years, cannot by any possibility be distinguished from the samples which you have forwarded, and which I presume have been only recently made.

The absence of free sulphuric acid in vegetable parchment having been satisfactorily established, it remained only to perform a few experiments on the strength of this material as compared with that of the animal parchment, with which it is likely to enter into competition. For this purpose bands of vegetable and of animal parchment, both seven-eighths of an inch in width, and as far as possible of equal thickness, were slung round an horizontal cylinder, and appropriately fixed by

means of an iron screw-clamp pressing both ends upon the upper part of the cylinder. The band assumed in this manner the shape of a ring, into the bend of which a small cylinder of wood was placed, projecting on each side about an inch over the band, and carrying by means of strings fastened to each end a pan, which was loaded with weights, until the band gave way. A set of experiments* made in this manner led to the result, that paper by exposure to the action of sulphuric acid in the manner described, acquires about five times the strength which it previously possessed, and that for equal weights, vegetable parchment possesses about three-fourths the strength of animal parchment. It was found, moreover, that bands of vegetable parchment taken from different sheets of the same kind of paper, exhibited a remarkable uniformity of strength, whilst in animal parchment, which owing to its mode of manufacture, must always present considerable inequality of thickness, extraordinary variations were observed, even if the bands were taken from the same skin. These results differ somewhat from those observed by Mr. Barlow, who found the strength of vegetable parchment higher than it would appear to be from my experiments. This discrepancy may probably arise from the fact that Mr. Barlow experimented with specially prepared paper, whilst I operated purposely on samples representing the commercial article, such as it is manufactured on a large scale.

Vegetable parchment, then, as far as strength goes, is not quite equal to animal parchment. On the other hand, the new article greatly surpasses real parchment in its resistance to the action of chemical agents, and especially of water. As has been already stated, vegetable, like animal parchment, absorbs water and becomes perfectly soft and pliable ; but it may remain in contact, and even may be boiled with water for days, without being affected in the slightest degree, retaining its strength, and regaining its original appearance on drying; on the other hand, it is well known how rapidly animal parchment is altered by boiling water, by the protracted action of which it is converted into gelatine. Even at the common temperature, animal parchment, in the presence of moisture, is very prone to putrefactive decomposition, whilst parchment paper, in which nitrogen, this powerful disturber of chemical balance, is absent, may be exposed to moisture, without the slightest change either in appearance or properties. It would, in fact, be difficult to find a paper-like material endowed with greater power of resistance to the disintegrating influences of water than vegetable parchment.

Taking into consideration the chemical composition of the new material, its cohesive power, and its deportment with chemical solvents, especially water, both at the common temperature, and at the temperature of its boiling point, it is obvious that this substance unites in itself, in a most remarkable manner, the conditions of permanence and durability, and I have no hesitation in stating my belief that vegetable parchment, properly prepared, is capable of resisting the tooth of time for many centuries, and that under various circumstances it will even last longer than animal parchment.

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* The following are the details of these experiments :—

WATER LEAF PAPER

broke, when loaded with

I.	II.	III.	Mean.
17 lb.	15 lb.	15 lb.	15.6 lb.

VEGETABLE PARCHMENT

broke, when loaded with

I.	II.	III.	Mean.
78 lb.	75 lb.	70 lb.	74 lb.

ANIMAL PARCHMENT

broke, when loaded with

I.	II.	III.	Mean.
92 lb.	78 lb.	56 lb.	75 lb.

The strips of vegetable and animal parchment were selected as nearly as possible of equal thickness, but the strips of the artificial product were somewhat heavier than those of real parchment. On an average the former weighed 18 grains, and the latter only 12.75 grains. Calculated for equal weights, the strength of animal parchment, as compared with that of artificial parchment, is obviously $\frac{18}{12.75}$ 7 5 = .105. In round numbers, it may be said that vegetable parchment has three-fourths the strength of animal parchment.

The valuable properties of vegetable parchment suggest a great variety of applications for the new material.

There is no doubt that parchment paper may be adopted, with perfect security, for all legal documents, policies of insurance, foreign bills of exchange, bills of lading, scrip certificates, and other similar documents, as a substitute for the skins which are now generally used. On the other hand, its comparatively low price would appear to suggest its application in a variety of cases, in which, at present, paper is employed : for instance, for private ledgers of banking-houses, or other large establishments, as well as for registries of wills, marriages, baptisms; and deaths. Even for the manufacture of bank-notes it may be found useful ; indeed, for all documents, the preservation of which is of importance. Many of the documents in question, in order to protect them from injury in case of fire, are generally kept in safes, the majority of which are now encased with solid water,—the water of crystallization in alum, and other similar hydrated compounds. The interior of these safes, in case of exposure to heat, must, obviously, become filled with steam of a high temperature, and it cannot be doubted that documents written on vegetable parchment, owing to the extraordinary power with which this material resists the action of boiling water and of steam, will stand a much better chance of preservation under such circumstances, than those written on common paper or animal parchment.

As another advantage of vegetable parchment as compared with animal parchment, the experience may be quoted, that vegetable textures are much less attractive to insects than animal structures. Moreover, to increase the security of vegetable parchment in this respect, the paper, before conversion, may be incorporated with chemical agents, which, like salts of mercury, for instance, have been employed with such advantage in the manufacture of paper for public records.

In considering the applicability of vegetable parchment for legal documents, another property of this remarkable material, although perhaps of minor importance, deserves nevertheless to be noticed. This is, the great difficulty with which words are erased from its surface, and others are substituted in their places. Deeds written on parchment paper acquire thereby a certain degree of security against falsification.

Its strength and resistance to water appear to recommend parchment paper in an eminent degree for engineers' and architects' plans, and especially for their working plans, which are often unavoidably subjected to rough usage and moisture. The thinner sheets of parchment paper on account of their transparency, present the additional advantage of being useful as a most durable tracing paper.

In consequence of its strength and resistance to water, vegetable parchment would probably find many applications for military purposes ; thus it promises to furnish an excellent material for water-proof cartridges.

Another field of considerable extent for the application of vegetable parchment appears to be in bookbinding, and especially in ornamental bookbinding. The books bound in parchment paper which accompanied your letter, are remarkable for the beauty and solidity of their binding. Experienced bookbinders, to whom I submitted these books, believed them to be bound in real parchment. Even in the manufacture of books and maps which, like those used for educational purposes, like military plans and nautical charts, have to stand considerable wear and tear, parchment paper may find a very useful application. The printing on ordinary paper is not changed by the treatment with sulphuric acid, but owing to the shrinking of the paper during the process, it will, probably, be found more convenient for such purposes to print on the paper after it has undergone the transformation. Vegetable parchment is remarkable for the facility with which printer's ink, as well as writing ink may be applied to it, and for its attraction for dyes generally, many of which it appears to take even more readily than calico. The specimens of dyed parchment paper which accompanied your letter, leave nothing that could be desired in this respect.

Among the numerous more or less important applications in which parchment paper is sure to be found useful as soon as it becomes accessible to the general public, its adaptation for household, and especially for culinary purposes, must not be left unmentioned.

In closing the orifices of vessels for preserves, &c., few housewives will hesitate to substitute an elegant material like vegetable parchment paper for the animal membrane, so frequently offensive, which is now generally in use.

Formed into bags of which the seams are cemented with the white of egg, parch-

ment paper will be found very useful for the purposes of boiling and stewing, according to the principles of a refined and scientific *cuisine*.

Nor can the chemist fail to derive some benefit from so interesting an achievement of his own science as the transformation of paper into parchment.

In the laboratory, vegetable parchment will become a material of general use for connecting retorts and condensers, or other similar apparatus, and on account of its indestructibility by many of the fluids usually employed in electric batteries, it will probably find a further and even more important application in the construction of diaphragms for galvanic apparatus.

I have the honour to be, Gentlemen, your obedient servant,

MESSRS. THOMAS DE LA RUE AND CO. A. W. HOFMANN.

ON THE SYNTHESIS OF THE HYDROCARBONS.

BY M. MARCELLIN BERTHELOT.

"IN living nature the elements appear to obey laws totally different from those in the inorganic kingdom; the products which result from the reciprocal action of these elements, consequently differ from those presented in inorganic nature. If we were to find the cause of this difference, we should have the key to the theory of organic chemistry. This theory, however, is so hidden, that we can have no hope of its discovery, at least for the present."

These words of Berzelius, written nine years ago,* accord with the path pursued by chemists until now, because they have decomposed organic substances, formed under the influence of life, but have not understood their re-composition from the elementary bodies.

Apart from the study of these immediate principles which are concerned in the constitution of living substances, chemists were limited at first to extracting, defining, studying these bodies, and observing the nature of the ultimate products of their decomposition—carbon, hydrogen, nitrogen, water, carbonic acid, ammonia, &c. Subsequently they were enabled to transform one into the other, splitting up the substance by reagents in a gradual and regular manner. It is thus that the complex substances, fixed and often uncrystallizable, formed under the influence of life, are converted into volatile and definite substances: for example, starch into sugar, sugar into alcohol, alcohol into acetic acid, &c. &c. It is thus that the ternary compounds containing carbon, hydrogen, and oxygen, are converted into carbides of hydrogen. It is thus that the greater part of organic compounds are grouped around the alcohols. In a word, instead of effecting an instantaneous decomposition of the organic compounds formed under the influence of life, the change may take place by successive degrees, resembling the steps of a ladder—passing from the first compound to bodies less complicated, from those to others, and thus from place to place, until the simple terms of the total destruction are attained.

But hitherto we have not been able to pass up the ladder again, starting with the elementary bodies, and combining them by the sole play of affinities which we are accustomed to set to work in the inorganic kingdom—the carbides of hydrogen, then the alcohols and the more and more complicated organic compounds.

Those who have investigated this science, in moving from the known to the unknown, without other basis than experimental considerations, have taken their starting-point in the study of the immediate products of organization. They proceed in general from lignine and starch to sugar, from sugar to alcohol, from alcohol to carbides of hydrogen. Singular mixture, although necessary, of chemistry and natural history, which robs science of a part of its abstract rigour.

But the examples of synthesis have been so rare, so isolated, and so little productive, that the majority of minds have been accustomed to regard as chimerical the hope to reproduce generally the organic substances, by means of the elementary bodies which compose them. Whatever might be the speculative opinions upon this subject, no alcohol had been experimentally produced by means of a carbide of hydrogen, no carbide had been formed by the union of these elements. Considering the extreme mobility of organic compounds, their peculiar physiognomy, the facility with which the weakest forces operate to their destruction, many chemists have thought that their formation, in the midst of the living organism, depended on "the

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* *Traité de Chimie*, tome v., page 1, traduction Française, 1849.

mysterious influence of the vital force, opposed in action, continually struggling with what we are accustomed to regard as the cause of the ordinary chemical phenomena." It is thus that Gerhardt spoke several years ago :—"I show that the chemist acts in opposition to living nature; that he burns, destroys, operates by analysis ; that the vital force operates by synthesis ; that it reconstructs the edifice demolished by chemical forces." (*Comptes Rendus*, vol. xv., p. 498.) In a word, science has proceeded until now by means of analysis, and has established little by little the general laws of those infinite transformations, which organic substances undergo by the action of reagents.

But is this analysis complete ? Do these laws give a sufficient idea of the forces which preside at the formation of organic substances ? Synthesis alone can solve this, and definitely establish the identity of the forces which operate in the inorganic and organic kingdoms, by showing that those of the first are sufficient to reproduce all the effects, and form all the compounds to which the second has given birth.

It is this work that I have pursued for eight years, and of which the present memoir contains the starting-point.

In fact, I have succeeded in forming from mineral compounds, and by strictly chemical means, the principal carbides of hydrogen, which, by the employment of general methods, I have converted into alcohols ; I have found several general processes by which an acid, an oxygenized compound, may be resolved into the corresponding alcohol ; a simple compound into a body more carbonized, and of a higher order of complication. In a word, all the first, and most difficult terms of synthesis are realized. The intervention of slow actions, of weak and delicate affinities suffice to attain the mark. They enable us to go further, for, in proportion as we proceed to the more complicated compounds, the reactions take place more easily and more variously, and the resources of synthesis augment at every step.

The experiments relative to the transformation of the hydrocarbons into alcohols have been described in a former paper. I will now describe the synthesis of the following carbides :—

Marsh gas	$C_2\ H_4$
Olefiant gas	$C_4\ H_4$
Propylene	$C_6\ H_6$
Butylene	$C_6\ H_8$
Amylene	$C_{10}\ H_{10}$
Benzine	$C_{12}\ H_6$
Naphthaline.....	$C_{20}\ H_8$

Carbon does not combine directly with hydrogen. In order to effect their combination, therefore, we must seek for some indirect process, and avail ourselves of the nascent condition, that is to say, the facility with which bodies enter into new combination at the instant of their liberation.

To prevent all suspicion as to the origin of the elementary substances employed in these experiments, the carbon was entirely obtained from its mineral combinations, and particularly from carbonate of baryta, for, in synthetical experiments, the results can only be regarded as conclusive when obtained with perfectly definite bodies, such as the gaseous, volatile, or crystallized bodies, and when none but purely mineral reagents and solvents have been employed in the operations. The results of these researches have been obtained under all the rigour of the foregoing conditions. Substances of organic origin, and particularly charcoal, have been rigidly excluded, because the results to which their employment might lead would necessarily be doubtful ; in fact, all these substances, and charcoal in particular, constantly retain small quantities of hydrogen, and generally preserve a special structure, dependent on their organic origin, which cannot be reproduced at will, and the influence of which on the phenomena we cannot appreciate.

The formation of the simplest hydrocarbons being demonstrated, we may convert them into oxygenous compounds, which then become the source of more complicated carbides ; from these again, corresponding oxygenous compounds may be formed, and we thus rise by gradual and regular transformations to more and more complicated compounds. The whole of these results will be explained in the following order :—

First. Transformation of oxygenous compounds of carbon into carbides of hydrogen, with some experiments on nitride of carbon and on carbide of iron.

Secondly. Transformation of sulphide of carbon into carbides of hydrogen.

Thirdly. Transformation of the chlorides of carbon into carbides of hydrogen.

Fourthly. Formation of the more complicated hydrocarbons by the action of heat on the acetates and butyrates.

Transformation of the Oxygen Compounds of Carbon into Carbides of Hydrogen.—The transformation of carbonic acid and carbonic oxide into carbides of hydrogen forms the most conclusive experiment of synthesis ; for carbonic acid and carbonic oxide are, in virtue of their gaseous state, very definite in their nature; they may be produced either from carbon itself or from any of its compounds, whatever may be their origin or stability, and particularly from the native carbonates, purely mineral combinations, and capable of being always reproduced. Either carbonic acid or carbonic oxide can be employed at will, the two bodies being readily converted one into the other by purely mineral agents.

Several processes have been employed in the course of these researches to resolve the oxygen compounds of carbon into hydrocarbons. The extreme stability of these compounds, as opposed to the facility of decomposition of the carbides of hydrogen, renders this change a very difficult one. Whatever agent is employed, it is hardly possible to directly decompose carbonic oxide at a lower temperature than a bright red heat, that is to say, a temperature at which the hydrocarbons and other organic compounds cease to exist. We know also that we cannot generally effect a reaction with bodies which are at a temperature approaching that which would destroy the combination, for the most of the facts appear to indicate that until the forces necessary to effect a combination at a certain temperature are prepared to effect a decomposition at a much higher temperature, they do not give rise to any appreciable reaction for an interval more or less protracted. Thus the processes for the direct reduction of carbonic oxide by the hydrogenated compounds have not furnished any satisfactory results. To effect the hydrogenation of the carbon, therefore, it has been necessary to divide the operation into two stages, by which we first enter the carbon into an organic combination, and produce formic acid by the direct union of carbonic oxide with the elements of water.

A primary ternary compound is thus obtained, composed of carbon, hydrogen, and oxygen, which is identical with those produced under the influence of life. It presents in its stability and its reactions the same general characters, that is to say, the same capability of being gradually transformed, under the influence of very weak forces, into new compounds analogous to itself, and formed equally by the union of carbon with hydrogen. In virtue of these properties, formic acid becomes available in the formation of new organic compounds. It is the first round of the series to which we attach successively all the others.

Transformation of Formic Acid into Carbides of Hydrogen.—Synthesis of Marsh Gas, Olefiant Gas, and Propylene.—Formic acid is a ternary compound, containing carbon, hydrogen, and oxygen. It is only necessary to remove, by any process, the oxygen which it contains, without destroying the association of the carbon with the hydrogen, to obtain the hydrocarbons. This elimination of the oxygen, independently of the hydrogen, is, however, far from easy ; in fact, formic acid alone is only susceptible of two kinds of reaction : either the hydrogen is separated in combination with half of the oxygen, in the form of water, the remainder of the oxygen being combined with the carbon as carbonic oxide—that is to say, we return to the point from which we started ; or the carbon of the formic acid is oxidized more or less completely, the hydrogen being disengaged in the free state or combined with oxygen in the form of water. In either case the hydrogen is separated without combining with the carbon.

This combination can however be effected by deoxidizing one portion of the formic acid at the expense of another portion, by which it is enabled to react upon the hydrogen ; the all-powerful affinity, which carbon exhibits for oxygen, being thus opposed to itself. This division may be effected by the employment of a powerful base, baryta, which determines at a high temperature the formation of carbonic acid, with which it combines.

Now carbonic acid contains more oxygen than formic acid, and the proportion is such, that if a portion of the carbon of the formiate of baryta is oxidized and separated as carbonate of baryta, the elements remaining will be carbon, hydrogen, and oxygen in equal equivalents :—

$$C_2\,H\,Ba\,O_4 = Co_2,\,Ba\,O + (C\,H\,O).$$

This carbon, hydrogen, and oxygen, thus placed before each other in the nascent

state in the same substance, react one upon another, producing all the combinations permitted by the conditions of the experiment. These three bodies are in such relative proportion, that they cannot be entirely resolved into binary compounds of oxygen ; a portion of the hydrogen and carbon must necessarily be set at liberty, unless they enter into reciprocal combination, which, in fact, is what is found to occur.

Amongst the resulting carbides of hydrogen, marsh gas, olefiant gas, and propylene have been isolated and characterized.

To sum up, the oxide of carbon unites with the elements of water, producing formic acid ; and the formiate of baryta, when distilled, yields the carbides of hydrogen. This is the starting-point of the synthesis of organic substances.

The following is the description of the two principal experiments, one of which was performed upon the formic acid prepared directly from the carbonic oxide, and being a fundamental experiment, is described in full. It may be divided into four stages :—1st. Formation of the formiate of potash with the mineral elements ; 2nd. Conversion of the formiate of potash into formiate of baryta ; 3rd. Distillation of the formiate of baryta ; 4th. Isolation of the olefiant gas and the propylene ; conversion of the olefiant gas into sulphovinate of baryta :—

1. The oxide of carbon was prepared by heating to bright redness a mixture of iron filings and native carbonate of baryta. The gas is thus obtained from mineral substances, capable of being reproduced at will in the same condition. The carbonic oxide, previously washed with potash and sulphuric acid, was transferred to sixty flasks, of one litre each, containing potash. They were filled in the following manner :—The flasks were chosen with a long neck, and sufficiently stout to resist the pressure of one atmosphere. They were washed and dried, and eight or ten grammes of water, and the same quantity of solid potash, perfectly free from organic matter, introduced into each of them. The neck of the flask was then contracted over the lamp in two places, and terminated with a kind of bulb, to which a tap was then attached by means of a piece of caoutchouc.

This tap is then connected by means of a second piece of caoutchouc to a leaden tube, leading to a pneumatic machine, by which the flask is as perfectly exhausted as possible. That done, the tap of the flask is closed, the leaden tube is detached, and a communication made with a gasometer containing the oxide of carbon. The taps of the flask and of the gasometer are carefully opened, in order that the filling may be gradual and regular. The water in the reservoir of the gasometer is replaced, to measure the gas which enters the flask, and its level enables the flask to be filled with the gas, under a pressure slightly superior to that of the atmosphere. The taps are then closed, and the flask detached and taken to a glass-blower's lamp, where the tap is opened and the flask closed, by drawing out the neck at the contraction.

When all the flasks are filled, they are packed with hay and linen in a large bath filled with water, which is kept boiling, and renewed as it evaporates. At the end of each week a small flask, intended for a test, is taken out and opened under mercury. The absorption of the oxide of carbon was completed at the end of three weeks, during which the temperature of the bath had been maintained at 212° F. for more than 200 hours. The time occupied in obtaining this result is longer than was indicated when we spoke of the synthesis of formic acid, apparently due to the strength of the potash, which was much weaker in the last experiment than in the first.

2. The absorption of the carbonic oxide and its conversion into formiate of potash being finished, it is necessary to isolate the acid and convert it into formiate of baryta. This is very readily done. It is only necessary to saturate the potash with sulphuric acid and distil, to isolate the formic acid, then to saturate with carbonate of baryta, and obtain by evaporation the formiate of baryta. For this purpose, the flasks are opened and the contents diluted with a very little distilled water ; we thus have an aqueous solution of formiate of potash, containing an excess of alkali and several mineral substances obtained from the glass of the flask. It is exactly neutralized with pure sulphuric acid diluted with its own volume of water, when crystals of sulphate of potash form in the liquid, which are separated by decantation. Sufficient sulphuric acid is then added to set free all the formic acid, and the liquid carefully distilled. When the greater part of the water charged with formic acid has passed over, the distillation is stopped, and a fresh quantity of sulphate of potash separated.

The distillation is then continued. Towards the end, some water is added to the contents of the retort, this addition being repeated as long as the distillate is sensibly acid. The distilled liquid, containing the formic acid, is saturated with carbonate of baryta, at a gentle heat, and the filtered liquid evaporated to crystallization. The weight of the formiate of baryta thus obtained was 300 grammes.

3. This formiate of baryta is submitted to the action of heat to obtain the carbides of hydrogen. The carbides which we propose to isolate may be of three kinds, first, liquid or solid; secondly, gaseous and capable of forming liquid bromides, volatile and definite. These are olefiant gas and propylene. The last are gaseous and incapable of combining directly with bromine under ordinary conditions ; such as marsh gas. The apparatus is arranged so as to collect separately these three classes of compounds. The following is the description:—The formiate of baryta is contained in a glazed stone retort of nearly a demi-litre capacity. The retort communicates with two little flasks, empty, and surrounded by cold water, arranged one after the other, and intended for the condensation of the liquids, then follows an eprouvette of an ovoid form containing 30 or 40 grammes of bromine placed in a layer of water. The gases disengaged in the retort and cooled in the first two flasks bubble through the bromine which retains the olefiant gas and propylene in the form of liquid bromides ; the gases which are not absorbed pass on, mixed with the vapour of bromine and are collected over the pneumatic trough. In order to diminish the chances of loss arising from the porosity of the retort, the whole apparatus is so constructed as to prevent the disengagement of the gases under the least possible pressure, without at all affecting their absorption by the bromine.

The bromine, the only reagent employed in this experiment, did not contain any appreciable trace of organic matter. 300 grammes dissolved perfectly in an alkaline solution, and 300 grammes, evaporated in a current of pure hydrogen, left no sensible residue.

The apparatus arranged, the retort is heated by carefully surrounding it with ignited charcoal, the liberated gas passes through the bromine, and is collected over the trough. In the first two flasks, some water condenses with a small quantity of empyreumatic liquids. When the operation is concluded, the products formed are carefully studied. The retort, when cold, is broken, in order to examine the contents, which consist of pure carbonate of baryta, intimately mixed with a small quantity of black, amorphous carbon. This carbon is remarkable for its origin. It came from the native carbonate of baryta, from which it passed as carbonic oxide. The liquid contained in the flasks consists of two layers, the greater part being water, charged with a small quantity of empyreumatic substance, and at the bottom of the vessel, some drops of a tarry liquid, having an odour exactly resembling that of the products of the distillation of sugar or tartaric acid. The quantity of this liquid was too small to permit of a very accurate examination, but it is evident it is composed of complex hydrocarbons, analogous to those formed in the destruction by heat of organic substances, properly so called.

Upon dissolving the bromine in a solution of soda, moderately concentrated and employed in excess, several grammes of a neutral liquid separate, heavier than water, and resembling Dutch liquid, and which will be noticed presently.

The gas collected over the trough is a mixture of carbonic acid, carbonic oxide, hydrogen, and marsh gas. The proportion of these gases vary at different periods of the operation. The following is the analysis of a sample collected during the middle of the distillation, and deprived of carbonic acid by means of potash :—

Marsh gas.....	10.0
Carbonic oxide.....	49.5
Hydrogen.....	40.0
Nitrogen	0.5
	100.0

4. The condensation of the olefiant gas and the propylene in the bromine, permits the separation of these carbides from the other combustible gases simultaneously produced. They are collected, however small their proportion, and the formation of the liquid bromides, definite, unaffected by cold, and permanent at a temperature of 50° or 60° C. in an alkaline solution, weak or concentrated, furnishes the first

indication of the existence of the carbides which possess the composition of bicarbide of hydrogen.

These bromides are purified by careful distillation. The largest quantity comes over about 130°, some portion between 130° and 150°, and several drops at a much higher temperature. These degrees of volatility correspond to the boiling points of the bromide of olefiant gas, the bromide of propylene, &c. These indications, however, must be corrected by analysis and direct examination of the bodies ; for which it is necessary to decompose the bromides and set free the carbides. This was done by reacting upon the bromides with copper, water, and iodide of potassium at 275° C., according to the process described by me in a paper on inverse substitutions.

In operating upon the mixture of bromides obtained in the preceding experiment, and distributed in three tubes, half a litre of gas was obtained, the carbon of which we know came from sixty litres of carbonic oxide. This gas is a mixture of olefiant gas, propylene, hydride of ethyle, a little carbonic acid, and a trace of nitrogen. The two first are regenerated directly from the bromides, whilst the carbonic acid and hydride of ethyle are secondary products formed during the regeneration. The nitrogen comes from the air in the apparatus.

The qualitative analysis of this gas can be effected by means of two solvents, bromine and concentrated sulphuric acid. The bromine absorbs the olefiant gas and propylene but leaves the hydride of ethyle. The concentrated sulphuric acid absorbs the propylene immediately, but does not dissolve the olefiant gas without violent agitation sustained during 3000 shakes. This last phenomena alone characterises the olefiant gas, for no other presents the same reaction.

[The details of the quantitative analysis of the gases are then described, by which the composition and identity of the separate compounds were determined, as well as their relative proportions ; which, taking the carbonic acid and nitrogen out of the account, was as follows]:—

Olefiant gas..... ..	76
Propylene.....	15
Hydride of ethyle.....	9
	100

Lastly, the gas regenerated from the bromides, and not employed in the analysis, is agitated for a minute with sulphuric acid, to separate the propylene. The remainder is then introduced into a flask, and agitated 3000 times with another portion of concentrated sulphuric acid, when all the olefiant gas is found in combination with the sulphuric acid as sulphovinic acid. It is diluted with water, saturated with carbonate of baryta, filtered and evaporated, when definite crystals of sulphovinate of baryta are obtained.

Thus in the preceding series of experiments, which occupied several months to perform, the carbon contained in the carbonate of baryta, after having passed successively into carbonic oxide, into formiate of potash, formic acid, formiate of baryta, olefiant gas, bromide of ditto, olefiant gas again, sulphovinic acid and sulphovinate of baryta, after having passed through ten successive combinations and been five times in the gaseous state, without once coming in contact with any organic matter, is found definitely fixed in a crystallized organic compound, the conversion of which into alcohol presents no difficulty. This experiment demonstrates completely the formation of alcohol by means of purely mineral elements, carbonate of baryta and water alone furnishing the elements of which the alcohol is formed. This fundamental experiment had been preceded by others, performed upon formiates obtained by easier processes, and intended to fix the conditions of the principal operations.

[One of these experiments is described in which the transformation of olefiant gas, obtained from the formiates, into alcohol, was carried to the end, and accompanied by an elaborate analysis of all the products obtained. It was performed upon a considerable quantity of material, and was especially intended to study the nature and the relative proportions of the numerous products formed in the decomposition of formiate of baryta by heat. The apparatus employed and the nature of the products obtained were precisely the same as those already described.]

(*To be continued.*)

NOTE ON THE RESULT OF AN ANALYSIS OF A PORTION OF THE BREAD WITH WHICH A-LUM WAS ACCUSED OF POISONING THE EUROPEAN RESIDENTS AT HONG-KONG.*

BY J. IVOR MURRAY, M.D., F.R.C.S., AND F.R.S.E.

(*Read before the Medico-Chirurgical Society of Edinburgh, Wednesday, March* 17, 1858.)

Although most of my readers must be familiar with the particulars of the case to which I am about to refer, I must crave their indulgence while I very briefly recapitulate the circumstances connected with it.

On the 2nd February, 1857, ten prisoners—Cheong Achew, Cheong Aheep, Cheong Achok, Lum Asow, Tam Aleen, Fong Angee, Cheong Amun, Fong Achut, Cheong A-lum, and Cheong Wye Kong—were tried before the Supreme Court of Hong-Kong for administering poison with intent, &c.

It was proved in the evidence that several Europeans, indeed all who had partaken of bread from the Esing Bakery on the 15th of January, 1857, were seized with sickness, vomiting, giddiness, and the usual symptoms of arsenical poisoning. Cheong A-lum was proved to be the owner of the Esing Bakery, and to have been in the bakehouse the evening previously, while the dough was being mixed. The other prisoners were in his employment. It was further proved that, previously to the 15th January, he had given out contradictory reports as to his intention of remaining in or leaving the colony. Evidence was laid to prove that much suspicion had attached to him, as being connected in some way with the gang of ruffians who seized the "Thistle" and murdered all the Europeans on board. Lastly, he actually left the colony on the very morning of the poisoning, taking his family with him.

The medical evidence, which is very insufficient in its details, or else very badly reported, I shall give nearly at length.

Dr. Harland says, after describing his own sufferings, consisting of vomiting, pain in the stomach, &c., "From the symptoms in my own case, and of others who came to us, I felt sure that arsenic had been administered in the bread. I brought down a piece of bread from the Parsees, and kept the remnant of our own. I had also several specimens from Dr. Dempster, Capt. Endicott, and others, and two loaves from Mr. Grandpré, which he took from the Esing shop and gave into my own hand. Dr. Dempster's and Capt. Endicott's I received on the 16th. Soon after the first alarm, I endeavoured to ascertain in a hasty way what was in the bread, and Dr. Bradford coming in, he and I satisfied ourselves that it was arsenic. Next day, at the request of the Colonial Secretary, we made a more careful analysis of each piece of bread separately, and found they all indicated the presence of arsenic. The analysis for ascertaining the quantity took place subsequently, and we found that one pound loaf of bread contained nearly a drachm of arsenic, sixty grains to the drachm, common white arsenic. The bread I ate was brown, the other specimens were white; both kinds contained arsenic; much less than a loaf contained sufficient to cause death. I also, on the afternoon of the 16th, had two jars brought me by a policeman, one containing yeast used on the night of the 14th, the other the materials for making yeast, together with some flour and some pastry from the bakery, paste scraped from the table, and some pastry in tin moulds. I found no trace of arsenic or other metallic poison in any of the materials. The analysis was made in the presence of Drs. Bradford, Kenny, Watson, and Dempster."†

It would appear that there were no further details given nor asked for, nor was any analysis of vomited matter made. Such, then, was the case for the prosecution.

The defence set up showed, that several of the prisoners, and others employed in the bakery, had suffered from sickness and vomiting on the evening preceding the 15th January, and which they at the time attributed to unsound vegetables they had partaken of, but which there can be little doubt must have arisen from their having swallowed some portion of the poisoned ingredients. It was further proved, that A-lum had not only taken a supply of the poisoned bread with him when he left the colony, but both he and his family had suffered from the use of it. And, lastly, there can be no doubt that, although brought back to Hong-Kong in custody, he had not only made no attempt to secrete himself in Macao, but had used every en-

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* *Pharmaceutical Journal*, vol. xvi., page 532.

† *China Mail*, 15th February, 1857.

deavour to return to the colony from the moment that he suspected anything wrong with the bread.

Upon such evidence the jury, very properly it seems, returned a verdict of not guilty against A-lum and the others.

This case suggests to us several remarks.

1st. There could be no doubt in reference to the poisoning. There existed, however, no sufficient evidence to implicate A-lum. Whence, then, did the arsenic come, considering that the amount used could not have been less than 10 lbs. altogether? I have been told that its presence in the bread has been explained by a story that the flour had been packed in America (from whence almost all flour used in China by Europeans is imported) in barrels which had previously contained arsenic.

2nd. The question arises naturally, then, Why did not the authorities investigate the matter further, and trace the arsenic to its source?

3rd. Why was such an extensive employment of so deadly a poison followed by no fatal case? I believe that this last question may, to a great extent, be answered by a reference to the habits of Europeans in China. Bread is but little used at breakfast, rice and fish being the usual substitute, and what small amount of bread is consumed being almost invariably eaten in the shape of extremely thin slices, thoroughly toasted—a treatment which would naturally tend greatly to vapourize a large portion of the arsenious acid.*

Although Dr. Harland's reported evidence is so meagre, there can be no doubt as to the accuracy of his conclusions. A portion of the poisoned bread was sent by post overland to Mr. A. Shortrede, who delivered it to me with the seals unbroken. In Dr. George Wilson's laboratory I broke the seals, weighed out 179.4 grains of bread, which was reduced to fine powder, digested with nitro-hydrochloric acid, and precipitated by hydrosulphuric acid. I shall not, however, go over the entire process followed. Suffice it to say, that from this 179.4 grs. bread I obtained 1.6 gr. arsenious acid, or equal to 62.3 grs. in the pound weight. The substance separated was further subjected to Marsh's and Reinsch's tests, and proved by nitrate of silver and by the ammoniated sulphate of copper, which in each case gave a characteristic reaction.

Baron Liebig, I find, has also analyzed portions of this bread, in which he detected 268 millegrammes of arsenious acid to the ounce of bread, or about 64 grs. to the pound. He says, that "this result does not of course invariably correspond with the contents of a whole loaf, as the arsenic was very unequally mixed with the dough, some portions containing considerably more than the above-mentioned quantity, while others were comparatively free from it." He goes on to say, "The lives of those persons who ate of the bread were evidently only saved by the circumstance that the arsenic had been mixed with the dough, and lay as it were imbedded in it, so that the poison could only act in proportion as the bread was digested by and dissolved in the stomach. The immediate consequence was a strong inclination to vomit, by which it appears the greatest danger must have been averted, inasmuch as the greater part of the poison was removed from the stomach with the undigested bread, before it entered the gastric juice and came in contact with the system."†

I have only to add, that I have recorded this case as interesting from the amount of arsenic supposed to have been swallowed without fatal results. Not the less interesting, I believe, as it admits of being explained either on Baron Liebig's theory of the expulsion of the noxious matter from the stomach, or my own view, that it never got to the stomach, but was, for the most part, sublimed by the previous toasting of the bread.—*Edinburgh Medical Journal*, July, 1858.

ON A COLOURING MATTER OBTAINED FROM THE *RHAMNUS FRANGULA* (BLACK ALDER).

BY M. T. L. PHIPSON.

After having extracted from the wood of the little baskets in which the butter of Bretagne is transported a colouring matter which I regarded as novel, I found that these baskets had been constructed of the branches of *Rhamnus frangula*, and,

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* Bread burns above 550° F. It is baked at from 450° to 550°. Arsenious acid volatilizes at 356° F.—*Vide* Miller's *Chemistry*, vols. ii. and iii.

† *China Mail*, 25th June, 1857.

subsequently, that M. Buchner, of Munich, in 1853, had extracted from the root of this plant a yellow colouring matter which he named Rhamnoxantine, and which is identical with that obtained by me from the branches. My observations on this colouring principle confirm those of the Chemist I have named. I may state at first that this matter is only present in the layer of liber and in the vessels of the medullary sheath of the *Rhamnus frangula*. I have also observed it in the *R. catharticus*.

It exists in the plant in the state of solution. M. Buchner extracted it from the roots of the black alder by means of ether ; it is then, however, accompanied by a fatty substance. To obtain it in a state of purity I digested the branches in sulphide of carbon for three or four days ; the liquid, which by this time is of a golden yellow colour, is evaporated at the ordinary temperature, and the residue treated with cold alcohol, which dissolves the colouring matter and leaves a peculiar brown fat. On evaporating the alcohol and dissolving the residue in ether, the colouring matter is obtained on the spontaneous evaporation of the ether, in the form of little brilliant crystals of a golden yellow colour.

Rhamnoxantine is a ternary body of a resinous or balsamic nature. It is volatile (as first stated by M. Buchner), and may be obtained by carefully subliming an extract got from the branches by alcohol, ether, or bisulphide of carbon, when it forms a white or yellowish vapour of an agreeable odour, which condenses like benzoic acid or alizarine. It is insoluble in water, most of the acids and salts ; soluble in the alkalies, ether, alcohol, and bisulphide of carbon. Water precipitates it from the three latter solvents. Ammonia dissolves rhamnoxantine, giving a magnificent purple red solution. Potash and soda comport themselves in a somewhat similar manner; with the alkaline carbonates the colour is less beautiful. These combinations of rhamnoxantine with the alkalies are soluble in water, alcohol, and ether ; but insoluble in bisulphide of carbon. The acids decompose them, giving the original yellow colour.

If concentrated sulphuric acid be poured upon rhamnoxantine, the golden yellow colour immediately passes to a very beautiful emerald green, which does not remain more than a minute, and, to preserve it, the acid must be immediately decanted. If the contact of the acid is prolonged the fine green colour passes to a purple and is finally dissolved by the acid forming a red solution, which, if diluted with water, returns to the original golden yellow. This green colour appears very stable, the dilute acids and alkalies do not affect it; it differs essentially from chlorophyll, and can be no other than the famous Chinese green.

Under different deozidising influences rhamnoxantine yields a new brown colour. With the oxides it forms lakes, the tints of which may be modified in a number of ways. By dissolving this principle in weak ammonia, supersaturating with citric acid and adding magnesia, a very beautiful violet lake is obtained. With a compound of tin a kind of chocolate coloured lake is obtained. With the oxides in general, rhamnoxantine yields red, brown, or yellow lakes, according to circumstances.

This colouring matter has much more affinity for silk and wool than for cotton. In dyeing with a bath prepared with the branches of the black alder and ammoniacal water, which is afterwards acidified by citric acid, we obtain upon silk a beautiful golden yellow tint. Upon wool we dye equally well a reddish brown and a yellow without the employment of mordaunts.

TWENTY-EIGHTH MEETING OF THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

Leeds, September 22nd.

The Meeting of the General Committee took place at one o'clock, when, the officers of the Sections having been elected, the usual reports were read. The first General Meeting, which was numerously attended, was held in the evening, at half-past eight, in the New Hall; the Rev. Dr. Lloyd resigned the chair to Professor Owen, who then delivered his inaugural address.

The officers for the Chemical Section were:—*President*, Sir F. W. Herschel. *Vice-Presidents*, Rev. W. Vernon Harcourt, Prof. Faraday, J. P. Gassiot, Dr. Andrews. *Secretaries*, Dr. Gladstone, W. Odling, R. Reynolds. *Committee*, Rev. J. Barlow, Dr. Edwards, W. Huggon, Dr. Jones, Dr. Macadam, J. Mercer, G. Morley, T. Scattergood, E. Schunck, Dr. Smith, W. S. Ward, R. Warrington, J. Waterhouse,

Dr. Matthiessen, H. Deane, G. Foster, J. P. Worsley, Dr. Russell, F. C. Calvert, J. Smyth, jun., G. Gladstone, Prof. Wheatstone, A. Gages, J. P. Joule, Dr. Liveing, F. Jennings, C. H. B. Hambly, J. Young, A. Galletly, Dr. Gilbert, Dr. Pugh, T. J. Pearsall.

The following remarks on the system of *Chemical Notation* formed part of Sir F. W. Herschel's address to this Section:—

"Perhaps I may be tolerated if I put in a word of reclamation against the system of notation into which chemists, who for the most part are not algebraists, have fallen, in expressing their atomic formulæ. These formulæ have been gradually taking on a character more and more repulsive to the algebraical eye. There is a principle, which I think ought to be borne in mind in framing the conventional notations as well as nomenclatures of every science, at every new step in its progress—viz., that as sciences do not stand alone, but exist in mutual relations to each other—as it is for their common interest that there should exist among them a system of free communication on their frontier points—the language they use and the signs they employ should be framed in such a way as at least not to contradict each other. As the atomic formulæ used by the chemist are not merely symbolic of the mode in which atoms are grouped, but are intended also to express numerical relations, indicative of the aggregate weights of the several atoms in each group and the several groups in each compound, it is distressing to the algebraist to find that he cannot interpret a chemical formula (I mean in its numerical application) according to the received rules of arithmetical computation. In a paper which I published a long time ago on the Hyposulphites, I was particularly careful to use a mode of notation which, while perfectly clear in its chemical sense, and fully expressing the relations of the groupings I allude to, accommodated itself at the same time perfectly well to numerical computation, no symbol being in any case juxtaposed, or in any way intercombined with one another, so as to violate the strict algebraical meaning of the formula. This system seemed for a while likely to be generally adopted ; but it has been more and more departed from, and I think with a manifest corresponding departure from intelligibility. The time is perhaps not so very far distant when, from a knowledge of the family to which a chemical element belongs, and its order in that family, we may be able to predict with confidence the system of groups into which it is capable of entering, and the part it will play in the combination. A great step in this direction seems to me to have been lately made by Prof. Cooke, of the Harvard University, of the United States (in a memoir which forms part of the fifth volume of the Memoirs of the American Academy of Arts and Sciences), to extend and carry out the classification of chemical elements into families of the kind I allude to, in a system of grouping, in which the first idea, or rather the first germ of the idea, may be traced to a remark made by M. Dumas, in one of his reports to this Association, and which is founded on the principle of arranging them in a series, in each of which the atomic weight of the elements it comprises are found among the terms of an arithmetical progression, the common difference of which in the several series are 3, 4, 5, 6, 8, and 9 times the atomic weight of hydrogen respectively. So arranged they form six groups, which are fairly entitled to be considered natural families, each group having common properties in the highest degree characteristic ; and what is more remarkable, the initial member in each group possessing in every case the characteristic property of the group in its most eminent degree, while the others exhibit that property in a less and less degree, according to their rank in the progression, or according to the increased numerical value of the atomic equivalent. Generally speaking, I am a little slow to give full credence to numerical generalizations of this sort, because we are apt to find their authors either taking some liberties with the numbers themselves, or demanding a wider margin of error in the application of their principles, than the precision of the experimental data renders it possible to accord, so that the result is more or less wanting in that close appliance to nature which makes all the difference between a loose analogy and a physical law ; but in this instance it certainly does appear that the groups so arising not only do correspond remarkably well in their theoretical numbers with those which the best authorities assign to their elements, but that it really would be difficult to distinguish the elements themselves into more distinctly characteristic classes by a consideration of their qualities alone, without reference to their atomic numbers. When we find, for instance, that the principle affords us such family groups as oxygen, fluorine,

chlorine, bromine, and iodine self-arranged in that very order ; or again, nitrogen, phosphorus, arsenic, antimony, or bismuth ; when we find that it packs together in one group all the more active and soluble electro-positive elements, hydrogen, lithium, sodium, and potassium, and in another the more inert and less soluble ones, calcium, strontium, barium, and lead—and *that* without outraging any other system of relations, it certainly does seem that we have here something very like a valid generalization : and I shall be very glad to learn in the course of any discussions which may arise on such matters as may be brought before us in the regular conduct of our business, from those more competent to judge than myself, whether I have been forming an overweening estimate of the value and importance of such generalizations. I will only add on the point, in reference to what fell from our excellent President in his address to the assembled Association last night, that this kind of speculation followed out would seem to me likely to terminate in a point very far from that which would regard all the members of each of these family groups as allotropes of one fundamental one, inasmuch as the common difference of the several progressions which their atomic weights go to make up, are neither equal to, nor in all cases commensurate with the first terms of these progressions. For instance, in the chlorine group, the first term being 8, the common difference is 9. Something very different from allotropism is surely suggested by such a relation. It would rather seem to point to a dilution of energy of one primary element by the super-addition of dose after dose of some other modifying element, and this the more strikingly since we find oxygen standing at the head of very distinct groups having very striking correspondences in some respects, and very striking differences in others. But all these speculations take for granted a principle, with which I must confess I think chemists have allowed themselves to be far too easily satisfied, viz., that all the atomic numbers are multiples of that of hydrogen. Not until these numbers are determined with a precision approaching that of the elements of the planetary orbits,—a precision which can leave no possible question of a tenth or a hundredth of a per cent., and in the presence of which such errors as are at present regarded as tolerable in the atomic numbers of even the best determined elements shall be considered utterly inadmissible,—I think, can this question be settled ; and when such gigantic consequences—so entire a system of nature is to be based on a principle—nothing short of such evidence ought, I think, to be held conclusive, however seductive the theory may appear."

The following were among the papers read in some of the sections :—

NOTE ON THE PRODUCTION OF A FROSTED SURFACE ON ARTICLES MADE OF ALUMINIUM.

BY DR. MACADAM.

Some aluminium had a short time ago been obtained, for the purpose of making medals. When the medals were struck, a peculiar grey appearance was noted on their surface, which it was supposed arose from the uncleanness of the die. Close examination, however, showed that this was not the case. Some of these medals were subjected to the action of hydrochloric acid and nitric acid separately, without producing much effect on their surfaces. When some of them were put in a solution of caustic potash they were acted on very violently, hydrogen being evolved, and the surface of the metal becoming beautifully frosted. This phenomenon of an alkali comporting itself to a metal as acids do, was worthy of the attention of chemists. After aluminium has been frosted in this manner, it does not become tarnished on exposure to the action of the air.

Mr. F. Crace Calvert considered the greatest objection to the use of aluminium in the arts arose from the fact that it decomposed rapidly in water, at 212°, and indeed at all temperatures more or less. A wire of aluminium which he had left closed in a tube of water for twelve months had become converted into gelatinous alumina. He found that aluminium, mixed with a small portion of iron, was less acted on by water than when pure.

ON A MODIFICATION OF RUHMKORFF'S INDUCTION COIL.

BY MR. W. LADD.

Having been rather extensively engaged for the last two years in the manufacture of induction coils, and having received the constant and able advice of J. P. Gassiot,

Esq., and the practical suggestions of Mr. C. A. Bentley, I have thought that a brief description of the machine as it is now made, with the results obtained, may not be uninteresting. My object has been not to make very large machines, but to obtain the greatest results from a three-mile coil, that being sufficiently large for all ordinary purposes. I find the best length for the iron core to be 13 inches and about 15.8 diameter, composed of fine iron wire not larger than No. 22, very carefully annealed. The primary wire should be of sufficient size to carry freely the whole of the battery current, and of sufficient quantity to thoroughly saturate the iron core with magnetism. For this purpose I use three layers of one continuous No. 12 copper wire carefully annealed: if more layers are used I find that the secondary wire is removed too far from the magnetic influence. The secondary wire ought not to be larger than No. 35, covered with silk, which must be laid on perfectly even and insulated from the primary wire, and also from the layers of the secondary next to it. I find the best insulating medium to be the thinnest gutta percha made, and which I believe to be the only gutta percha sold which cannot be adulterated; it is true that it has many minute perforations, but by laying on at least six thicknesses between each layer of wire perfect insulation is secured. The greatest care must be taken in protecting the ends of the layers so as to prevent the sparks passing from one to the other. The condenser should be at least 50 sheets of tin foil of about 1 square foot in size. These sheets must be separated from each other by three sheets of varnished paper or gutta percha tissue. Every alternate sheet of foil is connected together, thus forming two poles, to be attached one to each side of the break. It may be placed at the bottom of the stand or in a separate box, the latter I prefer. In developing the power of the machine everything depends upon the contact breaker, which should be capable of retaining contact until the whole of the magnetism is obtained, and capable also of breaking contact as soon as the smallest quantity is induced. *These results are obtained in the break attached to this instrument.* The hammer is made to vibrate freely between the iron core and the coil, and the brass screw terminating with the platina plate at the back of the hammer: a very small amount of magnetism will be sufficient to attract the hammer and so break the contact. If, now, I bring this screw (placed half way up the spring carrying the hammer) to bear upon the spring, it will have the effect of pressing the two platina plates together, so that it takes a greater amount of magnetism to separate them. By this means I can regulate the power of the instrument to the purposes for which it is required. The battery I employ is a five cells of "Grove's," with immersed platina plates 5+3, having an exposed surface of 140 square inches. With such a battery and a coil thus constructed, I can always ensure sparks from half an inch to four inches in air. The machine now exhibited contains six miles of wire, and worked with the same battery, gives $6\frac{1}{4}$ inch sparks. The position which the induction coil is now taking in this electrical age is one of considerable importance. It has awakened new philosophical ideas, and is being successfully applied to practical purposes of the highest advantage to mankind. For blasting purposes a three-mile coil is capable of firing fifty charges simultaneously. But important as its present position is, and successful as its past application has been, it is yet in its infancy, and there can be little doubt that by *patient perseverance* machines can be constructed that will obviate the necessity for employing such ponderous machines, and still more ponderous batteries, as are now at work on the Atlantic Cable.

ON THE PHOSPHORESCENT APPEARANCE OF ELECTRICAL DISCHARGES IN A VACUUM MADE IN FLINT AND POTASH GLASS.

BY MR. J. P. GASSIOT.

The discharge from an induction coil when taken in a vacuum tube made of flint glass, has (under certain conditions) the property of rendering the glass highly phosphorescent, the phosphorescence being denoted by the intense blue colour of the glass with which the stratifications are surrounded. On trying the discharge in some vacuum tubes I had obtained from M. Geissler, of Bonn, I observed that the phosphorescence was no longer blue, but was of a slight green colour. To test whether this difference was due to the gaseous matter remaining in Geissler's tubes, or to the character of the glass which he uses, I had Torricellian vacuums prepared in German glass tubes, and in this manner ascertained that the difference in the colour was entirely due to the character of the glass: that of Germany is, I believe, made with potash, and is entirely free from any lead, while in the English flint glass lead is

introduced to some extent. I have recently obtained a vacuum tube from Bonn, which shows this difference in a very beautiful manner: the outer ends of the tube are composed of German glass, the centre of the tube is of English glass ; by this arrangement the contrast between the two is very manifest.

AN INSTRUMENT FOR MEASURING THE CONSTANT INTENSITY OF OZONE.

BY DR. LANKESTER.

This instrument consisted of two small rollers included in a box, which were moved by means of ordinary clockwork. Over the roller a strip of paper, prepared with iodide of potassium and starch, is allowed to revolve, the paper becoming exposed to the air for an inch of its surface in the lid of the box. Twenty-four inches of paper pass over the rollers in the course of the twenty-four hours, and thus registers, by its colour, the intensity of the action of ozone in the atmosphere. By this instrument the intensity of the ozone for every hour in the twenty-four could be registered, and *minima* and *maxima* with an average be ascertained. The register of ozone could also be compared with those of the anemometer, and the relation of ozone to the direction and force of the wind ascertained. Dr. Lankester pointed out the importance of ascertaining the presence of ozone, on account of its undoubted relation to health. He drew attention to a series of tables which had been drawn up from the registrations of the anemometer made at London, Blackheath, and Felixstow, on the coast of Suffolk. From these it was seen that the relation of these three places was as 0, 22, and 55. The instrument acted also as a clock, and the time could be accurately marked upon the ozonized paper.

Mr. Marshall made some remarks on his own observations during the last twelve months, and stated that he had not been able to discover, though assisted in the investigation by medical gentlemen, that there was any obvious connexion between ozone and the state of health.

"On Electrical Discharges as observed in Carbonic Acid Vacuo," by Mr. J. P. Gassiot.

"On the Action of Hard Waters upon Lead," by Dr. L. Lindsay.

"On the Atom of Tin," by Mr. W. Odling.

"On Reciprocal Decomposition between Salts and their Acid Solvents," by Dr. J. H. Gladstone.

NOTE ON NITRO-GLYCERINE AND OTHER XYLOIDS.

BY DR. J. BAKER EDWARDS,
Lecturer on Chemistry and Toxicology, Royal Infirmary School of Medicine, Liverpool.

The author stated that he had made a considerable number of experiments upon various animals as to the physiological effects of this substance, which is known in medicine as glonoïne, and also of the corresponding xyloids obtained from starch and cotton; and that he found them possessed of powerful action upon the nervous system, terminating in death. Dr. De Vry, who first introduced nitro-glycerine to the notice of the British Association at Ipswich, stated that he had administered small quantities of it to rabbits and had not found it to produce death, from which he concluded that it was not a poison.

The experiments of Mr. Field called the attention of the medical profession to the very powerful action of this medicine in small doses upon the human system, and the author confirms the observation, that in doses of half a drop or one drop it produces intense and protracted headache and great irregularity in the action of the heart and lungs. Upon animals such as frogs, birds, mice, cats, and rabbits, these effects are very marked, but the animals recover from small doses. In quantities of from two to ten drops, a secondary chain of symptoms set in after apparent recovery from the first—viz., vertigo, trismus, violent tetanic convulsions, lasting in some cases for three or four hours, and then terminating in death by exhaustion. The pupils of the eye are dilated in the earlier effects of this poison, but in the stages which immediately precede death great contraction of the pupil takes place, and an indisposition to move almost amounting to unconsciousness is observed; when the animal is disturbed, however, a convulsive paroxysm takes place, resembling that produced by strychnine.

Similar results followed the administration of xyloidine obtained from starch; half a drachm produced death, attended with tetanic convulsions, in six hours.

The solution of pyroxiline dissolved in ether, known as collodion, failed to produce death even in large doses, and it appeared that the ether was antidotal in its effects. Ether, when administered to persons suffering from the effects of glonoïne, afforded prompt relief.

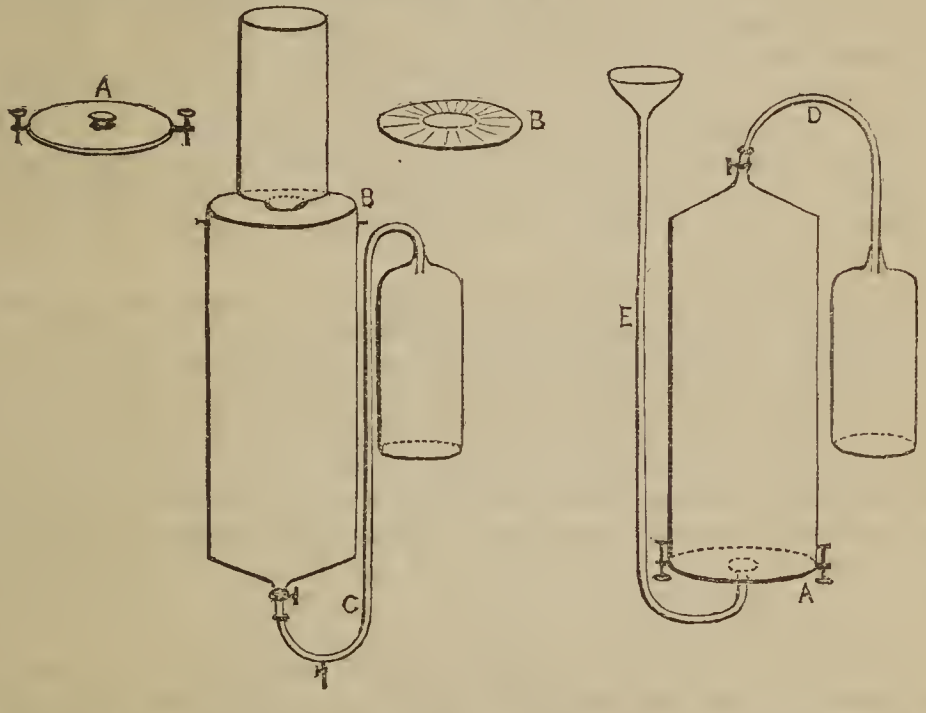
THE PROCESS OF PERCOLATION.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—While Dr. Squibb's paper on "The Process of Percolation," which appeared in your September number, is fresh in the minds of your readers, allow me to lay before them the following description of a percolator in daily use by me. I think it is uncommonly simple, economical, and efficient, especially for spirituous and ethereal menstrua, when it is injudicious or dangerous to have much costly and inflammable liquid in operation at one time.

It is completely automatic, by stages, and cannot go wrong by neglect, as at those stages the process safely (automatically) awaits the convenience of the operator.

Some essential minutiæ I will not notice, for the sake of briefness, as the ingenuity of your readers will easily supply them.



Your readers will understand at a glance that the inverted bottle at the top of the percolator gives out its contents only as air is admitted, and that air cannot be admitted so long as the mouth of the bottle is immersed in the liquid of the percolator; but, as percolation proceeds, the liquid in the percolator sinks from the mouth of the bottle so as to admit some air, the consequence of which is that an equal bulk of liquid escapes into the percolator, and raises the liquid's level there so as to prevent more air getting into the bottle, until sinking again takes place.

The escape or receiver tube (*C*), by running up the outside of the percolator to within a quarter of an inch of the surface of the solid contents of the percolator, prevents the liquid in the percolator from sinking more than a quarter of an inch from the surface of the solid contents, so that draining cannot take place; and as the inverted reservoir-bottle and the receiver-bottle are of the same capacity, it follows that when the former is empty, the latter is just full; and here the process stops until the operator finds it *convenient* to change the bottles, which he does by removing altogether the receiver-bottle (full), and substituting for it the reservoir-bottle (empty), and inverting a bottle of fresh menstruum on the top of the percolator, when the percolation instantly automatically proceeds as before.

After the last of the menstruum has passed into the percolator, it is drained by means of the little stop-cock, at the foot of receiver tube (*C*), into a bottle put there for the purpose, and, when draining is complete, *recovery* of that menstruum which the solid contents still retain, is set about in the following manner:—

Remove the loose cover *B*, and fill up the space above the solid matter with straw, then put on the tight cover *A*, and screw it tightly home. Invert now the percolator, and for the pipe *C* substitute the pipe *D*, and couple to the cover *A* the funnel pipe *E*. On pouring water into the funnel the menstruum will be displaced by the water, and escape by the pipe *D*, under which a bottle is placed as a receiver.

The value of this arrangement consists in taking advantage of the *natural tendency* of the light menstruum to be above the heavier displacing agent—water; and also in driving the whole of the menstruum, *not back the way it came*, but right through the whole mass, thereby getting the benefit of its exhausting power to the fullest.

Yours truly,

Edinburgh, October 19*th*, 1858. A. W. P. Smith.

COMPOUNDS OF IODIDE AND BROMIDE OF MERCURY WITH THE ALKALOIDS.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—That the double iodides of mercury and the alkaloids are not new, and that it is therefore necessary for me to correct my original impression that they were so, I am informed by Mr. Perrins, in the last number of your Journal.

I will therefore at once withdraw from any supposed claim of originality, and confess to the inutility of the caution respecting the testing for strychnia by the use of the iodide of potassium and mercury. When, however, Mr. Perrins proceeds to say, "It is therefore obvious that the salts observed by Mr. Groves are not new, but, on the contrary, have been frequently noticed," I must dissent by observing, that, *at present*, there is no evidence that the double bromides have been before noticed, nor do I see why Mr. Perrins should, in speaking of my production, suppress all of its title that refers to these compounds.

The paragraph of Gmelin to which that gentleman appeals gives no details of the compounds of iodide of mercury with the alkaloids, which, however, will in all likelihood be supplied in subsequent numbers; we are therefore compelled to turn to the paper of Dr. Nessler, "On a New Test for Ammonia," and which, "it is certainly a little singular," Mr. Perrins has entirely failed to understand, or certainly he would not have confused the compound (Hg_4 N, I + 2 Ho) with the double iodides and bromides of which I treated, and point to it as a "corresponding compound."

In fact, *for aught he has shown to the contrary*, the actual nature of the combination of protiodide of mercury and the alkaloids had not been previously published, as Dr. Nessler states that "alkaloids give the same reaction, a whitish precipitate, with this reagent, that they give with solution of iodide of mercury in iodide of potassium, that does not contain free alkali." "This reagent" referring to his test for ammonia.

The doctor certainly does *not* state that they are double iodides, and probably the sameness of the reaction may refer solely to the whitishness of the precipitates. In conclusion, I would observe that I did not, nor do I, make any *positive* claim to originality (which, indeed, after glancing through Gmelin's index, would almost seem a folly), yet if all the facts of which my paper treats were previously generally known, I presume it would not have appeared either in the *Pharmaceutical Journal* or that of the Chemical Society.

I am, Sir, your obedient Servant,

Weymouth, October 21, 1858. Thomas B. Groves.

ELECTRICITY IN DENTISTRY.

TO THE EDITOR OF THE PHARMACEUTCAL JOURNAL.

Sir,—In the *Times* of Thursday last there is an account given of a meeting of dentists to discuss the merits of electricity as an anæsthetic in the extraction of teeth, at which meeting the President gave it as his opinion that electricity did not deaden pain.

Were such an opinion expressed at a public meeting in Chester, the individual would stand as great chance of being laughed at as if he gave it as his opinion that the sun did not possess the power of illumination ; as almost every person who has had a tooth extracted in this neighbourhood within the last two months is quite of the contrary opinion. I am, Sir, your obedient servant,

Bridge Street, Chester, Oct. 20, 1858. Wm. Higgins.

DANGEROUS ORNAMENTS.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Dear Sir,—As being "forewarned is to be forearmed," you will perhaps consider the following of sufficient importance for a place in your Journal.

A short time since, a medical friend brought me, to ascertain if the material would be of commercial value, a small portion of a Chinese carving (or casting?), consisting of a group of figures, &c., about a cubic foot in size. I need scarcely describe the appearance of this fragment, when I say that analysis at once showed it to consist of realgar, the red sulphuret of arsenic.

From its fracture and the use made of the substance, I supposed it to be some composition, and confess my surprise at the results indicated by my first test. Should these be imported, or brought over as presents, by persons ignorant of their nature, the danger must be great, more especially as from the softness and friability of the material they will be likely soon to become scratched and defaced, and, having lost their ornamental value, would probably be put carelessly on one side, or perhaps given to children as playthings: in either case we can readily imagine serious accidents occurring, and innocent persons suffering under, apparently, well-grounded suspicion.

I cannot learn that at present these are articles of commercial enterprise between the Chinese and ourselves, and hoping they may not become so,

I remain, dear Sir, yours obediently,

140, *Leadenhall Street, Oct. 23rd*, 1858. Stephen Darby.

IGNORANCE OF THE QUALITIES OF DRUGS.

Last week five persons suffered considerably at Longhoughton, near Alnwick, from taking an overdose of tartar emetic ; the person who administered the dose as a cooling beverage to the others and to himself having completely forgotten the difference between tartar emetic and cream of tartar. Fortunately, medical aid arrived in time to prevent any loss of life.—*Times*, September 30.

POISONING BY CARBONATE OF LEAD.

An inquest was concluded on Monday, Sept. 27th, by Mr. Lovegrove, coroner for Gloucestershire, on the body of Thomas Taylor, who died under circumstances raising a strong suspicion that he had been poisoned. The deceased had one child by his wife, and an illegitimate child also lived with them. About six months since, the deceased's brother, Charles Taylor, a returned convict, went to reside in the same cottage: this appears to have led to frequent quarrels between Thomas Taylor and his wife, and it appeared from the evidence that the latter had expressed a strong partiality for Charles Taylor, and wished that her husband was dead. About a week before his death the deceased was seized with violent pains in the stomach, which continued at intervals until the 4th of September, when he died.

Mr. Anthony Martin, surgeon, deposed that he was called in to attend deceased on the 28th August, and sent him two pills of blue pill and opium, and a mixture of senna and peppermint water. On Wednesday, Sept. 1st, this medicine was repeated, at the request of deceased's wife, who stated that her husband was again seized with pain in the stomach and vomiting. The bottle produced was the one he had supplied, but the mixture was altered in colour and taste. On Saturday, Sept. 4th, Charles Taylor called on witness to say that his brother was dead, and asked for a certificate as to the cause of death. In conjunction with Mr. M. Perry, surgeon, witness made a *post-mortem* examination of the body, which disclosed no disease except that of the lungs, which was of long standing.

Mr. William Herapath, analytical chemist, of Bristol, stated that he had analyzed the contents of the stomach, and also other parts of the body ; from the former he had separated by subsidence four grains of a white coarse powder, which proved to be carbonate of lead; he also produced a spangle of metallic lead reduced from it, as well as

tests in the form of the black sulphuret, yellow chromate, and iodide of lead. Lead was also separated in the same forms from the liver. The contents of the bottle said to be the medicine was found to consist of two parts—a clear solution of green colour, and a sediment of much darker colour. The former proved to be solution of sulphate of iron, containing ninety grains in the two ounces; the sediment weighed eleven grains, and consisted of astringent vegetable matter. Witness had also examined a grater and a few particles on the paper which enclosed it; these particles he had proved by the microscope to be nux vomica. From the fact of lead being found in quantity in the liver, Mr. Herapath was of opinion that death had arisen from that poison.

The jury returned a verdict of "Wilful Murder" against Ann Taylor and Charles Taylor. The woman was then committed for trial, and a warrant was issued for the apprehension of Charles Taylor, who had absconded.

POISONING BY PHOSPHORUS.

The Court of Assizes of the Loire a short time since tried a woman named Philippon, of the neighbourhood of Roanne, for poisoning her two children. She led a most scandalous life, and frequently expressed a desire to see her husband and the children dead, in order that she might be enabled to indulge more freely in debauchery; she even threatened to put them to death. On the 3rd of June last, the boy, who was previously in good health, was taken ill with pains in the bowels, and with vomitings, and in twenty-four hours he died. A few days after, the girl died with equal suddenness. The woman manifested not the slightest concern at the death of either, and even before the boy breathed his last she covered his face as if he were already dead. On examining deceased, it turned out that they had been poisoned by phosphorus, and it was ascertained that the boy, at the moment of being taken ill, had said to a neighbour that his mother had given him something to drink which was "made of lucifer matches;" it was also ascertained that she had promised a woman of her acquaintance 100f. to bring poison for her.—*Lancet*, Oct. 2nd.

POISONING BY PRUSSIC ACID.

On Wednesday, October 6th, Mr. Wakley held an inquest at No. 6, Leighton Grove, Kentish Town, on the body of Mr. Joseph Skinner, aged 31, surgeon, who committed suicide. Mrs. Emily Skinner deposed that she was 26 years of age, and the deceased was her husband. She was his second wife, and there were four children, three of whom were by his first marriage. He was addicted to drinking, and after doing so suffered dreadfully from *delirium tremens*. He had been indulging during the latter part of last week, and was very bad on Monday. At about ten minutes past one o'clock on Monday afternoon she went down stairs, and deceased was in his bedroom. She suddenly heard him call out, "I've done it," and, fearing something had happened, she ran up-stairs and found her husband lying back on the bed dead, and the blue phial produced, and a glass with some liquid in it, lying by his side. She sent for Mr. Mills, of 46, Gloucester Terrace, and Mr. Rawlings, of Francis Terrace, who said deceased had taken prussic acid. In answer to questions, it was elicited that the deceased was formerly in extensive practice at Brixton, and that when his father died, ten years ago, he left him a fortune of £10,000. He had, however, squandered it away, and had, as a last resource, effected a bill of sale on his goods. This, it was believed, caused him to commit the act. The jury found that "Deceased destroyed himself whilst in an unsound state of mind."

POISONING BY MURIATE OF BARYTES.

On Friday, October 1st, a young woman, aged 22 years, named Sarah Allen, a barmaid in the employ of Mr. M. Saxon, licensed victualler, Tib Street, went to her master with a piece of paper in her hand, and asked what it contained. It was muriate of barytes, used for testing vinegar; and she was told that it was poison. She then said she had taken half a teaspoonful of it, thinking it was salts. She had found it upon a top shelf while cleaning the windows. Mr. Saxon gave her an emetic, and sent for surgeons, who administered the proper remedies; but she continued to

sink, and died on Saturday morning. An inquest was held on October 4th, by Mr. A. Fonblanque, deputy coroner, when a verdict of "Accidentally poisoned" was returned.—*Manchester Guardian*, October 5th.

DEATH FROM CHLOROFORM.

Monday afternoon, October 4th, a long inquiry took place before Mr. W. Payne, the City coroner, at the Royal London Ophthalmic Institution, Moorfields, respecting the death of Daniel Pheby, aged eight years. It appeared that the deceased, who had a "cast" in both eyes, attended at the institution on Friday to undergo an operation for the removal of the deformity. He was accompanied by his father, who left the lad at the entrance to the operating-room. At the expiration of nearly an hour the father was informed by Mr. Maber, the house-surgeon, that his son had died from chloroform administered to him previously to the operation. Mr. Maber stated that the chloroform was administered by Mr. Lloyd, a medical practitioner; it was dropped on a piece of lint, which was held to the mouth and nostrils of the patient in such a manner as to allow the passage of a current of air. Another medical gentleman watched the patient's pulse, and two medical men were always engaged in the administration of chloroform. A *post-mortem* examination showed that deceased's brain was highly congested, and his death had undoubtedly been caused by the effects of the chloroform. The coroner having expressed an opinion that during the administration of chloroform it was desirable that one medical man should watch most attentively the action of the patient's pulse, the jury returned a verdict, "That the deceased had died from the effects of chloroform."

[The above is the substance of a report already published. We have been informed, through another channel, that the unfortunate patient was much alarmed at the idea of the operation, and that his distress was much increased by meeting on the way to the operating-room a patient who had just undergone a severe operation. He was with considerable difficulty induced to inhale the chloroform, and we doubt whether it is correct to attribute the fatal result to the physical effect of the chloroform so much as to the influence of fear on a nervous patient.—Ed.]

DEATH FROM ESSENTIAL OIL OF ALMONDS.

On Saturday, October 9th, a man named George King, aged 50, was at work on board the *Panther*, lying at Fresh Wharf, London Bridge, unloading some cases of essential oil of almonds, when one of them broke, the oil running on the deck of the vessel. The deceased went on his knees and licked some of it up, in spite of being told that it was poison. He was found very ill on London Bridge by police-sergeant White, who conveyed him to St. Thomas's Hospital, where Mr. Whitfield, the resident medical officer, assisted by the staff of that institution, rendered every assistance, but he died shortly after his admission.

BOTANICAL COLLECTION OF BONPLAND.

The last number of the *Comptes Rendus* contains a letter from M. Alexander Von Humboldt to M. Elie de Beaumont, in which the illustrious writer, in expressing his regret at the death of Bonpland, which is now precisely known to have occurred on the 11th of May last, earnestly requests the professors of the Jardin des Plantes to take immediate measures for entering into possession of the extensive hortus siccus left to that establishment by the deceased. In case Bonpland should not have left a will, M. Von Humboldt states that he has a letter of his, dated Corrientes, June 7, 1857, in which he distinctly states his intentions on that subject; this letter M. Von Humboldt places at the disposal of the museum, if necessary for the assertion of its rights. He further states that among Bonpland's collections intended for the museum of Paris there are those which he and M. Von Humboldt made together in their expedition of the Orinoco, Quito, and Mexico. These collections were divided by them into three parts—one for the museum of Paris, another for M. Bonpland, which was sacked by Dr. Francia's troops when M. Bonpland was arrested, and a third for M. Von Humboldt himself, which he afterwards presented to Professor Wildenow, under whom he had studied botany, and which has since been bought by the Prussian Government.—*Times*, Oct. 1st.

BOOKS RECEIVED.

A Course of Practical Chemistry, arranged for the Use of Medical Students. By W. Olding, M.B., F.C.S., &c. &c. London: Samuel Highley, Fleet Street, 1854. (Three copies.)

Transactions, Laws, Bye-Laws, and Ninth Annual Report of the Liverpool Chemists' Association. Session 1857-58.

TO CORRESPONDENTS.

A. P. S. (London).—(1.) Benzole and turpentine are the solvents generally used for india-rubber. (2.) Black varnish for leather is made by boiling together a gallon of boiled linseed oil, 8 oz. of umber, and 3 oz. of asphaltum; when sufficiently cool thin with oil of turpentine.

W. J. (Great Malvern).—If the lotion referred to be carefully made, as directed, no separation will take place.

S. C. (Andover).—In making tincture of senna the stones of the raisins are rejected as inert; it would not be strictly correct to use the stoneless variety; by cardamon seeds, of course the seeds deprived of the husks are intended.

X. Y. Z. (Highworth).—In the Minor Examination a general acquaintance with the preparations of the Pharmacopœia is required, but a knowledge of the exact proportion of all the ingredients is not expected. A diagnosis of the natural orders and genera of Plants is required in the Major Examination.

W. P. (Nailsea).—Hooper's *Physician's Vade Mecum* is published by Renshaw, price 12s. 6d., 1858.

A Member (Stepney).—Probably Phosphorus Paste would be effectual in destroying the red ants in a house.

E. W. (London).—In making lip-salve, &c., the colouring material should be enclosed in a muslin bag.

T. (Sheffield).—*Latin Pharmacopœia, Selecta è Prescriptis*, Fownes's *Chemistry*, Royle's *Materia Medica.*

X. Y. Z. (Barnsley).—Fownes's *Chemistry*, Bowman's *Practical Chemistry.*

S. (London).—The specimens have been received, and will be made use of when an opportunity occurs.

A Student (Liverpool).—(1.) The strength of the Vinum Opii of the London Pharmacopœia is about two-fifths more than that of the Edinburgh; in that of the Dublin Pharmacopœia, the difference between avoirdupois and troy weights must be borne in mind. (2.) In the case of sheep poisoning referred to, the arsenic was supposed to be merely mechanically diffused in the grass.

A Member (Islington).—The absurd paragraph in which Professor Holloway is styled "the famous English pharmaceutist," is the production of a venial Editor, who, having fattened on his advertisements, inserts a paragraph in gratitude, hoping for more. The penalty for the use of the title pharmaceutist is not applicable, it not being proved that the party assumes or uses the title himself.

An Apprentice (City of London).—The letter has been forwarded.

J. H. T. (Liverpool.)—The operation of the Medical Act in reference to quacks is noticed, pages 249-50 of this number.

W. A. J. (Liverpool) has sent an extract from a letter of a medical practitioner in Derby to a patient in Liverpool, as follows:—"Dear Sir, I have great pleasure in sending you a recipe for aperient pills, two of which may be taken at bedtime occasionally. A druggist ought not to charge more than 3*d.* for them."

℞ Pil. Rhei Co.
Pil. Coloc. Co. āā ℈ij.
Ext. Hyoscyami. gr. x.
Pulv. Ipecac. g. iij.
Ol. Carui. gtt. vj. ♏.
Ft. pil. xxiv.

If these pills be worth only 3*d.*, of what value is the advice of the doctor?

M. P. S. (London).—It is not lawful to retail methylated spirit. See the conditions of sale, vol. xv. p. 138.

Instructions from Members and Associates, respecting the transmission of the Journal, before the 25th of the month, to the Secretary, Elias Bremridge, 17, Bloomsbury Square, W.C.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington Street. Other communications to the Editor, 15, Langham Place.

THE PHARMACEUTICAL JOURNAL.

VOL. XVIII.—No. VI.—DECEMBER 1st, 1858.

ADULTERATION AND POISONING.

The Bradford tragedy has revived some of the legislative speculations of the last session; and not only in Bradford, but in many other places, the opinions of the press tend towards the conclusion that another effort should be made to protect the public against a recurrence of similar catastrophes. The Mayor of Bradford suggested that a public demonstration should take place, and petitions should be prepared for presentation to Parliament in favour of a Bill for regulating the Sale of Poisons. If Parliament had been sitting at the present time, it is not improbable that some rather extraordinary and particularly stringent measure would have been brought forward. The features of the case which appear to dwell prominently on the public mind, are the facts that twenty persons have lost their lives and upwards of two hundred have suffered serious illness, and that this calamity was occasioned by culpable negligence or carelessness in the custody and sale of a dangerous poison. On a *primâ facie* view of such a question, it is a natural inference that the vigour of the remedy should bear some relation to the magnitude of the evil; and however extravagant or theoretical might be the proposed measure, some very weighty arguments would be required to counterbalance the twenty deaths and two hundred cases of illness thrown in the scale in its favour. Nevertheless, this element of apparent weight is entirely foreign to the question at issue. The question is not, how many persons were killed or injured by one accident? but, was the occurrence one which might have been prevented by Act of Parliament, and against a repetition of which an amendment of the law would be practically available? In solving this question there can be no advantage in appealing to the passions, and legislating in haste during the influence of a panic; and we think it rather a favourable circumstance that an interval must elapse before the meeting of Parliament, during which time the prevailing excitement will to some extent subside, and the public will have an opportunity of calmly and rationally considering the subject.

Two distinct offences were comprised in the Bradford case—the parties concerned *accidentally* committed manslaughter, while it was their avowed *intention* merely to be guilty of a wicked adulteration. If the accident had not occurred the fraud would most likely have escaped detection, and no Sale of Poisons Bill which has yet been framed would have been applicable to the use of "daff" for the purpose intended; for although the introduction of sulphate of lime into the stomach in the quantity indicated might prove injurious to the health, especially when given to children, that substance does not come under the designation of a poison according to any of the proposed schedules. With regard to the arsenic, an Act of Parliament is already in force for regulating the sale of that poison, but the Act was not applicable to this case, as the arsenic was not intentionally sold; nor would any system of entry or registration of poisons

generally have prevented this particular accident, for the law already provides for the entry of sales of arsenic, and the substance intended to have been sold instead of arsenic is not on the list of poisons.

In what manner, then, might the accident have been prevented? Simply by a conspicuous label, and by the cask being kept in a safe place. It appears, however, that the cask was labelled arsenic, but by some accident it was placed upside down, consequently the label was not seen. It appears, also, that the "daff" was (as stated by Mr. Hodgson to his boy) in the *corner* of the attic, whereas the cask of arsenic was found afterwards by the police officer, not in the corner, but near the middle of the room, by the side of the stairs. It may be inferred, therefore, that if the boy had attended literally to his master's instructions, the accident would not have occurred.

What, then, is the state of the law in reference to this case? and what security, if any, exists against the recurrence of such a disaster? The usual security provided by the law—whether against positive crime or culpable negligence—consists in the infliction of a punishment on offenders, the dread of which operates as a motive for obedience. In the present case, three persons are committed to take their trial for manslaughter. Twelve months' imprisonment, therefore, awaits all or any one of the three defendants against whom culpable negligence can be clearly proved. Should this fail from a defect in the evidence, or from any other cause, the injury sustained by the Druggist at whose establishment the arsenic was obtained, and the confectioner by whom it was mixed in the lozenges, cannot be computed in pounds, shillings, and pence —unless by estimating the value of the business, which, after such an event, might be set down as almost NIL. It will be seen, therefore, that the law already provides for the infliction of a very severe punishment on those against whom can be substantiated a charge of culpable negligence resulting in the loss of human life. *With persons acquainted with the nature and properties of poisons, and duly impressed with their responsibility as vendors of such substances, no stronger motive for caution could exist than the dread of a verdict of manslaughter, or absolute ruin, as the probable result of a fatal accident arising from negligence on their part.*

But it would appear that this contingency does not afford to the public sufficient security against carelessness or crime in the sale of poisons. The punishment is remote and uncertain. It is not associated in the mind directly with the offence. Some persons are habitually reckless. They have conducted their business for years as their fathers did before them, without any particular attention to labels in their warehouses. They have retailed poisons like other goods to their customers indiscriminately, and hitherto no accident has occurred to bring home to their minds a sense of their responsibility. Others are ignorant of the nature of poisons. Like the boy who, for want of a candlestick, plunged a lighted candle in an open cask of black powder, which happened to be gunpowder, they are unconscious of the risk they daily incur while dealing with these instruments of life and death. Boys who can neither read nor write are employed in warehouses and shops where poisons are kept. Hucksters and provision dealers keep their little stores of food and poison—arrowroot and

white precipitate, oxalic acid and Epsom salts, "daff" and arsenic—for the convenience of the public, who, having been served with a pennyworth of each article required, frequently without any label or distinctive mark, pay their money and take their choice. The only source of surprise is the fact that, under these circumstances, the number of cases of poisoning is so unaccountably small. But when accidents occur, involving the loss of many lives, as in the case of the Bradford tragedy; or when a series of crimes, such as the Essex poisonings, the Norfolk poisonings, with the exploits of Palmer, Dove, and others, are brought to light, the public attention is naturally and forcibly drawn to the subject, and surprise is expressed at the facility with which poisons may be obtained, and the carelessness with which they are sometimes kept and retailed.

Then arises the question, what is the remedy? It is not to be supposed for a moment that the reckless retailers of poisons have any criminal intention—that those who disregard the use of labels, and sell food and poison indiscriminately, without proper precautions, are conscious of any guilt. They are ignorant of the nature of the materials with which they deal, and consequently not aware of the danger they incur. It may be laid down as an axiom, that no Act of Parliament for regulating the sale of poisons can be of any possible efficacy, so long as all persons, however ignorant and uneducated, are permitted to deal in poisons *ad libitum*.

The first and most important step, therefore, in legislating on this subject, should be that of placing the sale of poisons in the hands of properly qualified persons.

Some of our correspondents have expressed dissatisfaction at the publication of cases of poisoning in this journal. They think it is placing on record the delinquencies and misadventures of the members of our body, and thus courting the interference of the Legislature in the form of some oppressive and inconvenient Act of Parliament. We differ entirely with those who entertain this objection. No possible advantage can arise from the suppression of the truth. If it be the fact that the welfare of the public requires the passing of a Sale of Poisons Bill, the suppression by us of the statistical evidence, afforded by a series of cases, would neither be creditable nor calculated to promote the interest of our body. We opposed the Sale of Poisons Bill of last session not from a spirit of opposition, but because some of its provisions were impracticable, and others involved the sale of poisons in a complication which would have increased instead of diminishing the danger. The Bill was founded on a theoretical view of the qnestion, and when submitted to the test of practical experience, its defects were made manifest.

On looking over the cases of poisoning which we have published from time to time, we see no reason to regret such publicity; on the contrary, the inferences to be drawn from the evidence before us are rather satisfactory. We find that a very small proportion of the cases have occurred with Pharmaceutists or regularly educated Chemists and Druggists. It must not be forgotten that human nature is fallible, and that from the Judge on the woolsack down to the errand-boy who is sent for "daff" to the warehouse, no person can boast of

immunity from accident or inadvertence, but the statistics serve to show that with duly qualified men such casualties form rare exceptions to a general rule. We find other exceptions also of rare occurrence: where a medical man, a Member of Parliament, a Chemist, or some other person to whom no law would have denied the privilege of having poison in his possession, becomes the victim of some mental depression or bad influence, and suicide or criminal poisoning is the result. Against these exceptional cases no effectual preventive measure has been, or can be, suggested. Many of the cases on record were purely accidental, traceable to no cause which legal interference could have prevented or human foresight anticipated. Against such casualties there is no safeguard, unless it be the general diffusion of knowledge with regard to the danger of poisons, with suggestions as to the importance of attention to labels, and the safe custody of such substances, whether used for domestic purposes, or in the arts and manufactures. There are, however, a considerable number of cases illustrative of the reckless sale of poisons by illiterate persons, the careless proximity of such substances with articles of food or domestic medicines, and the indiscriminate sale of poisons in small quantities to all applicants without discretion or precaution. It has frequently occurred that a poison has been refused by several Chemists, and eventually procured at a small huckster's shop. Lives have often been saved and accidents prevented by the precautions taken by the Chemist either in declining to sell the poison, or insisting on the requisite precautions in its use, information which the huckster or provision dealer would not have been able to give. The first and most prominent source of danger, therefore, in the sale of poisons, consists in the incompetence of many of the vendors, and the obvious remedy would be, that of placing this responsibility in the hands of qualified persons.

The next source of danger is the neglect of the use of labels; and unquestionably every poison—not only the poisons in the schedule of the Bill of last session, but every drug or substance comprised in the Materia Medica, or sold for the arts or manufactures—should be distinctly labelled, whether in the shop, or warehouse, or when sold to the public.

Another danger consists in the want of proper arrangement of poisons in the shop and warehouse. This precaution, as well as that of using labels, is observed by properly qualified Chemists and Apothecaries; but it is difficult to frame, in an Act of Parliament, a general rule, which could be enforced in every variety of business with regard to such classification.

It is worthy of remark that the Bradford tragedy occurred in consequence of the master of the shop being ill and unable to execute the order himself. There are many Chemists in the country who keep no assistant, and whenever any one of these Chemists is engaged in serving on a jury, his shop is of necessity left under the charge of his apprentice or errand-boy, with the same liability to some fatal accident or mistake.

The adulteration of lozenges with "daff" must be dealt with as a separate question. This is no accident or mistake. The parties who resort to the practice do so with the premeditated intention of committing a vile fraud. They adopt slang names for the substance employed: "daff," "daft," "terra

alba," "alibi," &c., as bakers who use alum in bread call it "stuff." They take care not to purchase the "daff" in their own neighbourhood, but sneak into a town at some distance, or send a boy, ignorant of the nature of his errand, who innocently brings the trash—"daff" or arsenic, as the case may be—to be substituted for sugar in lozenges, made for general distribution among children and others who frequent the market.

For such an offence a small fine would scarcely be an appropriate punishment. Ten or fourteen days' imprisonment, with hard labour, might impress on the mind of a master confectioner the propriety of abstaining in future from the use of "daff" in his peppermint lozenges.

PHARMACEUTICAL EDUCATION—AND THE SALE OF POISONS.

The course of events has, for many years, been gradually tending towards the conviction, that Pharmaceutical education and the sale of poisons must be dealt with together. When we insisted on this self-evident fact, more than fifteen years ago, the sentiment excited no attention. It was supposed to be a merely theoretical idea, and the proposal to protect the public against the danger arising from the improper use of strong medicines, or from accidental poisoning, by raising up a qualified class of dispensers of medicine, was disregarded as a visionary project. Time after time we have reiterated our views on the subject, taking advantage of passing events to illustrate the force of the arguments, and encouraged occasionally by quotations which we were enabled to throw into the scale from the pens of great authorities in the profession, both British and foreign. The facts have never been disputed. No attempt has ever been made to subvert or contradict the assertion, that the safety of the public, in regard to strong or poisonous medicines, is directly connected with, and dependent upon, the competence of the persons who are engaged in dealing with these substances; and that the skill of the Physician is absolutely thrown away, unless the dispenser of the prescription be duly qualified to perform his part of the duty with accuracy. It is not always gratifying to have one's own way in an argument—especially when we are told, "Yes, all that you say is perfectly true, no one would think of denying it;" and when, nevertheless, the party having made this admission dismisses the subject from his mind, and never bestows another thought upon it. Such, however, is the fate of periodical literature. It is ephemeral. A subject may be discussed with spirit in a journal, the wisdom of a deduction may be self-evident, the policy of a particular course of conduct or principle of action may be demonstrated and admitted, but in a month, perhaps in a week, it is consigned to oblivion, and the journal or newspaper to the trunk-maker.

After many years of hard labour in the cause, it is satisfactory to observe a favourable reaction. Not only has the indifference which formerly prevailed in some degree subsided, but a spontaneous spirit of discovery is manifested by our contemporaries in all parts of the country. It would almost appear as if the trunk-maker and the butterman, in turning over their old stock of waste paper, had stumbled upon some early numbers of the *Pharmaceutical Journal*, and that the sentiments and statements therein contained had, by some accident, found their way into the columns of other periodicals, where they come forth with all the charm and influence of novelty. Almost the entire metropolitan press, and all the provincial journals which have come under our notice, in commenting upon the Bradford tragedy, as well as other recent cases of poisoning, have directed attention to the impropriety of entrusting the sale and manipulation of dangerous substances to incompetent hands. We are reminded of the number

of boys in various parts of the country, of whom Goddard is a specimen, who are freely allowed to retail poisons of all kinds, although they cannot distinguish arsenic from plaster of Paris, oxalic acid from Epsom salts, or any chemical compound from any other that happens to look like it. Even the *Times*, a journal not addicted to the practice of gathering fruit before it is ripe, has made some forcible allusions to the responsibility of the Legislature in continuing to sanction free trade in the instruments of life and death by incompetent persons, and has acknowledged the principle that all dispensers of medicines should, before commencing business, be required to give proof that they are duly qualified, by passing a regular examination.

Such is the conclusion towards which public opinion is tending, under the excitement naturally occasioned by a succession of fatal accidents which serve as illustrations of the casualties to which we are liable under the present system of free trade in poisons. We were led many years ago to the same conclusion, not so much by the number of accidents as by a consideration of the infinitely greater number of narrow escapes which the daily experience of a Pharmaceutical Chemist brings under his notice. We have among the drugs and chemicals in daily use many dangerous poisons resembling *in appearance* substances comparatively inert: we have chemicals *the names* of which are similar, while the properties are so different that the accidental substitution of one for another would be fatal to life. We see family recipes, curious specimens of orthography, in which the quantities of the ingredients are indicated by the pennyworth, leaving to the conscience or discretion of the Chemist the decision as to how much "suppliment" (corrosive sublimate), or "spirit of salt," or calomel, &c. &c., he shall give for a penny. Prescriptions, blotted, or obscured with erasures and alterations, occasionally tax the experience of the dispenser in deciphering them; or sometimes an oversight occurs, the correction of which depends on his sagacity and knowledge of the doses of medicines. The public require to be continually cautioned with regard to the use of medicines they purchase, whether poisons commonly so called, or other substances equally requiring care, and accidents are often prevented by the discretion of the Chemist in declining to sell strong medicines until he has satisfied himself that the purchasers may safely be entrusted with them. Such being a few of the risks and responsibilities of the dispensing counter, a Chemist practically acquainted with the subject, shudders at the idea of an ignorant boy being placed in such a position, and only wonders that accidents are not more frequent than they are, when it is recollected that in the present state of the law, any person, however ignorant, may open a Chemist's shop and dispense life or death, as the case may be, at his discretion. It being therefore admitted by all parties that the sale of poisons and the dispensing of prescriptions ought to be in the hands of duly qualified and trustworthy persons, the question arises, how is this object to be secured? To this end the efforts of the Pharmaceutical Society have been directed for many years.

As it was impossible by means of a voluntary society, or even by Act of Parliament, to transform all the then existing dealers in medicines into philosophers and scientific men, there was nothing to be done but to form the nucleus of a Society by the association together of those Chemists and Druggists who were earnest in the undertaking, and to provide for the better education of the rising generation, of whom the future members of the Society should consist. It was found necessary to establish a School of Pharmacy, as the young men complained that they had no adequate means of preparing for the examination, the passing of which was compulsory on future Members of the Society, and although some knowledge might be obtained by reading and private study, and lectures on chemistry, materia medica, and botany were delivered in London and some other places, yet the knowledge acquired from books alone was found to be generally superficial; and most of the lectures being designed for medical

students, were not exactly calculated to meet the requirements of the Pharmaceutical Chemist. Practical instruction in the laboratory could only be obtained to a very limited extent, and on terms which placed it beyond the reach of the Pharmaceutical student. The School of Pharmacy, therefore, in Bloomsbury Square, was founded in 1842, the means of instruction consisting of lectures on Organic and Inorganic Chemistry, Practical Pharmacy (comprising all the processes and preparations of the Pharmacopœia), Materia Medica (adapted to the Pharmaceutical Chemist, the medical portion being omitted or much curtailed), and Botany (illustrated by living plants, a portion of the course being delivered in the Royal Botanical Gardens in the Regent's Park). A laboratory was fitted up for the accommodation of about ten students, which number was afterwards increased to thirty, by the addition of another compartment.

It may be readily imagined that the commencement of such an undertaking was attended with considerable difficulty. The law did not require Chemists and Druggists to be educated; the medical profession, although applauding the effort, did not appear enthusiastic or sanguine as to its success; the employers of young men in some instances objected to the interference with their domestic arrangements which the attendance of lectures occasioned; and the students themselves were not likely to be much impressed with the practical importance of a branch of education which their parents and predecessors had not thought necessary, and which increased their daily labour, already sufficiently onerous. Notwithstanding these obstacles and difficulties, the school prospered. Some of the Members attended the early courses of lectures, which example encouraged their Assistants and Apprentices, and at the termination of each session the examination of the students who competed for prizes gave a favourable indication of progress.

More than fifteen years have elapsed since the opening of the School of Pharmacy. The attendance of students has fluctuated from year to year, but with a tendency to gradual increase; and the report of the School last session was more encouraging than at any previous period, not only with regard to the number of students, but the proficiency to which some of them had attained, and the evident growth of a desire for improvement.

It is worthy of remark that the prevalence of any agitation respecting a proposed extension of the powers conferred by the Pharmacy Act, with a probability of the examinations being made compulsory, has a direct influence on the influx of students to the School, and on the number of candidates for admission into the Society. From this circumstance, we may confidently infer that the application of such stimulus by the Legislature is all that is required to secure for the public an amply sufficient supply of qualified dispensers of medicine.

We have hitherto looked only on one side of the picture, namely, the practical working of the School of Pharmacy, and its efficiency in bringing about the object in view, namely, improved Pharmaceutical education:—and, it must be admitted, that this view is satisfactory; in fact, that the School has realized quite as much as its most sanguine promoters could have anticipated, as a voluntary institution.

If, however, we turn to the pecuniary view of the case, we find that the School not only yields no surplus revenue, but that it entails upon the Society an expenditure of several hundred pounds per annum. Such an establishment is not likely to be self-supporting. Several experiments have been tried in other places with a similar result. The Royal College of Chemistry, notwithstanding the distinguished patronage it enjoyed, and the appearance of early prosperity, was, within a few years of its establishment, in such a position, that it was only saved from bankruptcy by becoming a Government institution. The Practical School at the Museum of Geology, in Jermyn Street, is dependent on the Government; which is also the case with the Laboratory of University College.

None of these establishments can pay their expenses without some extraneous resources. The School of the Pharmaceutical Society is, therefore, no exception to the general rule. It was not founded as a speculation, and it is carried on with the certain knowledge that it must inevitably entail on the Society a heavy annual expense.

But this is not all. At the time the laboratory in Bloomsbury Square was fitted up, its internal arrangements were constructed on what was then supposed to be the best principle; it was, for a time, a model laboratory, and was referred to by parties engaged in fitting-up institutions of a similar nature. As years pass away, improvements are introduced in this, as well as every other department of science or industry, and the laboratory, at the present time, requires some extensive repairs, and, in some of its appliances, it must be almost remodelled, in order to maintain its position among the scientific institutions in this country. It is also too small for the existing demand, and if an Act of Parliament should be passed giving a stimulus to Pharmaceutical education, it would not accommodate one-third of the students who might be expected to resort to it. We noticed, in a recent number, the addition which has been made to the museum, and the prospect of further improvements, with a view of increasing the accommodation of the library. A plan is now under consideration for removing the laboratory to another part of the building, with the addition of a portion of the two adjoining houses, which will afford means for a very considerable enlargement; and also for the construction of a more commodious lecture-room. Nothing being at present decided, we can only state, in general terms, that an extensive alteration and improvement of the premises will be necessary, which will entail on the Society a heavy expenditure.

The sum required for the enlargement of the laboratory may be considered a necessary expenditure, not on account of any remunerative return likely to be derived directly from the laboratory—which, as we have already observed, is not self-supporting, nor would it be so even with the increased number of students—but the projected improvement is necessary for maintaining the character and efficiency of the Society, and affording facilities for scientific education, without which it would be difficult if not impossible to fill up the ranks of the Society with a regular supply of properly qualified members.

The Pharmaceutical Society has a mission to perform for the maintenance of its own credit and for the public advantage. The Society has undertaken within a limited number of years to furnish to the public an ample and efficient supply of competent and trustworthy dispensers of medicine, in whose hands may safely be placed the sale of poisons as one portion of their responsibility. With the aid of the Legislature the Society has the means of accomplishing this object in the course of about ten or twelve years, without such aid the time required might be twenty or thirty, and even then the reformation would not be complete, because during every year that free trade in poisons by ignorant persons is permitted to continue, a fresh supply of such ignorant persons enter the drug trade, and thus, to some extent, frustrate the efforts in the direction of general improvement.

While the Society is arriving at an ultimatum so desirable for the public welfare, and while it is appealing to the Legislature for enlarged powers to enable it effectually to carry out this object, the expenditure of a thousand or two thousand pounds in the renovation and perfection of its establishment, should be met in a spirit of liberality, indicating that the Members of the Society are in earnest in what they undertake.

THE PRELIMINARY FERMENTATION UNDER THE MEDICAL ACT.

The privilege of representation is by some persons considered the great specific against abuses. It is the primary subject of discussion with Parliamentary reformers, and enters more or less into the constitution and vitality of most of our social institutions. One of the difficulties in framing a Medical Bill consisted in the anxiety evinced by all existing corporations to be duly represented in the Medical Council, and if it had been proposed that any one of the Colleges or Universities should be passed over, every member of the aggrieved body would have been up in arms against such an oversight or indignity.

These difficulties having been overcome and the representation granted to the several corporations, the mode of exercising the privilege has in some instances given rise to a new species of excitement. The Royal College of Surgeons of England, and the University of London, are at issue with their respective governing bodies, as to the mode in which, and the parties by whom, the representative is to be elected. The Senate of the University has elected Dr. Storrar, on which the graduates (about 200 in number) met in convocation, for the purpose (among other business) of passing resolutions and taking some step with a view of superseding the election. It is maintained by the legal adviser of the Senate, that when the Legislature confers a new power on any corporate body, without specifying who are the parties to exercise it, the rule of law is that it rests with the governing body. On the other side it is contended, that the privilege of electing a representative is conferred not on the Senate, but on the University of London, and this is held to imply the University in convocation assembled. After a long discussion, two or three motions, and many amendments having been moved, with a rather doubtful result as to the precise tenor of the one ultimately carried, it was decided in accordance with the advice of Mr. Edwin James, that the opinion of the law officers of the Crown should be taken.

The College of Surgeons having elected Mr. Green as the representative of the College, and this election having been objected to by the members on the ground above stated, the Council of the College obtained counsel's opinion on the question at issue—which opinion proved to be favourable to the parties on whose behalf it was obtained. The members then referred the case to Mr. Edwin James, and as every one knows that the opinion of counsel is greatly influenced by the mode in which the case is drawn, it is not very surprising that Mr. James gave his opinion on the other side, maintaining that the election of a member of the Medical Council under the new act is not included, or intended to be included, in the powers of the Council. Armed with this opinion, which is full and explicit, the belligerents have issued a protest, and are about to proceed immediately to the Court of Queen's Bench for a decision. Whether the graduates of the University of London will adopt the same course or not, will probably depend on the opinion about to be obtained from the law officers of the Crown.

On behalf of the Medical Profession it is to be regretted that this disagreement has taken place. Whether the representatives be elected by the entire body of graduates or by the Senate or Council representing that body, the chief object to be desired is the selection of an efficient and trustworthy member to fill so important an office, and the existence of any disagreement or distrust between the governing body and the members at large is likely, while it continues, to interfere with the satisfactory working of the principle of representation. It is to be hoped, however, that the misunderstanding is only temporary, that as soon as the question at issue is settled, harmony will be restored, and that on the payment of a suitable tribute of gratitude to the sister profession, all past differences will be buried in oblivion.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

MEETING OF THE COUNCIL, *3rd November*, 1858.

Present—Messrs. Ballard, Bird, Bottle, Brew, Davenport, Deane, Meggeson, Moore, Morson, Peacock, Squire, and Waugh.

MAJOR EXAMINATION, *16th November.*

Deighton, Thomas Milner.....Worcester
Dowse, Thomas Stretch .....Bradford-on-Avon
Gray, Frederick.....London
Parker, Charles .....Clapham

MINOR EXAMINATION.

Bennett, George.....Blandford
Sanger, William Albert .....London
Tollinton, Richard Bartram .....Stowmarket
Weller, James William .....Bloxwich

REGISTERED APPRENTICES.

NAMES.	RESIDING WITH	ADDRESS.
Collier, William	Mr. Collier	Sheffield
Curtis, Albert Augustus...	Mr. Churchouse.....	Chard
Hughes. Griffith Hugh ...	Mr. Hughes	Holyhead
Ive, William	Mr. Lawrence	Kensington
Leppard, James	Mr. Williams.....	Horsham
Umney, Charles	Mr. Corrie	Bedford

PHARMACOPŒIA COMMITTEE.

The following letter was read at a meeting of the Committee on the 4th of November, and a copy was directed to be sent for publication in the *Pharmaceutical Journal*, where the subject has already been adverted to at page 250, in the number for November, 1858:—

College of Physicians, London, Oct. 29th, 1858.

Sir,—At a meeting of the Pharmacopœia Committee, held Oct. 26th, a letter having been read from Mr. Deane, Chairman of the Pharmacopœia Committee of the Pharmaceutical Society of Great Britain, enclosing a circular issued by the College of Physicians of Edinburgh to the Pharmaceutical Chemists of that city, and inquiring with which College the members of the Pharmaceutical Society in Edinburgh should in future communicate on the subjects mentioned in that circular, Mr. Redwood being also present by invitation on the part of Mr. Deane, who was unable to attend.

It was resolved,—That, in the opinion of this Committee, it is desirable that the members of the Pharmaceutical Society of Edinburgh should be left at liberty to reply individually, according to their own experience, to the inquiries of the College of Physicians of Edinburgh; but in order that the London and Edinburgh Colleges may receive the same recommendations, and to further the production of a National Pharmacopœia, it is desirable that the members of the Pharmaceutical Society in Edinburgh should, as a body, communicate with the Pharmaceutical Society in London, and that the London Society should communicate their final conclusions and recommendations to both Colleges.

I have the honour to be, Sir, your obedient Servant,

Fred. J. Farre, M.D.,
Chairman of the Pharmacopœia Committee.

To the Chairman of the Pharmacopœia Committee of the Pharmaceutical Society of Great Britain.

PHARMACEUTICAL MEETING.

Wednesday, November 3d, 1858.

MR. W. L. BIRD, VICE-PRESIDENT, IN THE CHAIR.

The following

DONATIONS TO THE LIBRARY AND MUSEUM

were announced:—

The Assurance Magazine, from the Institute of Actuaries.
Journal of the Photographic Society, from the Society.
Journal of the Society of Arts, from the Society.
Bulletin de la Société Botanique de France, from the Society.
Proceedings of the Royal Institution; List of Members of the Royal Institution, from the Institution.
A specimen of sugar from coffee; ditto of mannite from dandelion root, by Messrs. T. and H. Smith.
Fourteen specimens of drugs from India, from Dr. Waring, of Travancore.
Collection of Chinese drugs, from Dr. Lockhart.
Preparations from Indian bael, from Mr. Gould.
A specimen of amadou, from Mr. W. Matthews.

PRIZES FOR HERBARIA.

The prizes for Herbaria, the award of which was announced at the previous meeting, were distributed as follows:—

Bronze Medal .....Mr. James Frodsham Robinson.
Certificate of Merit.....Mr. George Henderson Whitehouse.

LINIMENTUM SAPONIS.

Mr. Henry Deane, Chairman of the Pharmacopœia Committee, in bringing this subject under the notice of the meeting, said he wished to elicit the opinion of Members with reference to some questions which had occupied the attention of the Pharmacopœia Committee, and in reference to which he had been engaged in making some experiments. It would be generally acknowledged by those upon whom devolved the duty of preparing the medicines ordered by the different Pharmacopœias of the kingdom, that they ought, on principle, not to deviate from the instructions given for their guidance, but that the integrity of every preparation should be maintained as far as practicable, whatever may be the methods indicated for accomplishing the objects proposed. It happened unfortunately, however, that in spite of the care bestowed upon the improvement of formulæ in the Pharmacopœia, some oversights occurred from time to time which rendered it necessary to make slight alterations in order to carry into effect the obvious intentions of the authors of the work. The difficulty of producing a perfect Pharmacopœia was far greater than was generally thought to be the case. The Colleges of Physicians were constantly endeavouring to make improvements in the formulæ, and otherwise to render the Pharmacopœias they sent forth for the guidance of those engaged in the preparation of medicines more explicit and complete. He held in his hand a work called the *Pharmacopœia Reformata*, published so long ago as 1745, which evinced the great necessity existing at that time for a revision of the various formulæ recognized by the London College; and a reference to the several Pharmacopœias subsequently issued by the College, served to indicate the successive improvements which had been effected. The valuable aid rendered to the College by the late Mr. Richard Phillips had contributed much towards this result. He was a man of considerable experience and ability, and he laboured hard to improve the character of the Pharmacopœia, yet even he failed occasionally for want of a more intimate acquaintance with the requirements of the compounders

of medicines. Some such failures, indeed, might occur with those most practically acquainted with the subject. The preparation he had undertaken to bring under their notice, Linimentum Saponis, would serve to show how easily defects sometimes crept into one part of the Pharmacopœia, while improvement was being made in another part.

The formulæ for Linimentum Saponis given in the three Pharmacopœias of London, Edinburgh, and Dublin, differed in some respects, but the essential ingredients in each case were hard soap (made of olive oil) and spirit of wine. In the London and Edinburgh Pharmacopœias "soap" was ordered without anything to indicate the particular state in which it was intended to be, while it was well known that soap contained variable quantities of water, the quantity present being sometimes twenty per cent. more when it was new than would be the case after it had been kept for a few months and had become dry. The spirit ordered in the London Pharmacopœia consisted of eighteen ounces of rectified spirit mixed with two ounces of water, while the Edinburgh Pharmacopœia ordered rectified spirit alone. In either case, at the temperature of 60° or 70°, the soap would not entirely dissolve, but on heating it to 90° or 100°, merely a high summer temperature, the solution was completed in two or three days. After the solution had been effected, however, on allowing it to cool down to about 50°, much of the soap separated in a gelatinous form, so that the liniment could not be readily poured from a bottle, and if the temperature should fall much below 50°, it became a nearly solid mass, quite unfit for dispensing purposes. It would thus be seen that the liniment may be made in summer without artificial heat, and that during the continuance of summer weather it would be fit for use, but in the winter it would be otherwise. It might be said, perhaps, that the Colleges did not order the application of heat, yet the seasons could not be controlled, and it was but the difference between summer and winter that determined its solid or fluid state. The Colleges no doubt intended the whole of the soap to be dissolved, or they would not have ordered it. It seemed probable that some cause might be found for the unsatisfactory results of the preparation of Linimentum Saponis by the formulæ of recent Pharmacopœias. On referring back to the London Pharmacopœias, it would be found that in 1745 the spirit of rosemary ordered to be used in making the liniment was but little stronger than proof spirit. The case was also the same in the Pharmacopœias of 1788 and 1809, during which periods soap liniment was, as at present, made with spirit of rosemary. In 1824 the College ordered spirit of rosemary to be distilled from rectified spirit, although in Thomson's Dispensatory of the same date proof spirit was ordered; and it was worthy of remark that this work was at that time more generally used than the Pharmacopœia itself, probably because it contained among much other valuable matter, the whole of the formulæ of the three British Pharmacopœias. Again, in 1836, rectified spirit was ordered. In 1851 the defect which had crept into the formula having become obvious, the College directed two ounces of water to be added to every eighteen ounces of the spirit, with the view of preventing the gelatinezation of the liniment. The proposed remedy for the defect had not, however, proved effectual, as the spirit was still too strong to ensure a uniformly fluid liniment. In the formula of the Dublin College, "*dried soap, powdered,*" and "*proof spirit*" were ordered, and on trying this process it was found that the whole of the soap dissolved, and that the resulting liniment remained fluid at all temperatures. The soap, too, was in a definite condition, and if of the best quality, was not likely to be different at one time from what it was at another time. The remedy, therefore, for the defect in the present formula of the London Pharmacopœia was obviously to order dried soap and proof spirit. Of course, until this alteration was made by the College, the present instructions must be followed as nearly as possible, just so much water being added as would keep the soap in solution at all temperatures.

There were one or two other points connected with this preparation to which

he would refer. If mottled Castile soap were used, in the fresh state, before the contained oxide of iron had become red by peroxidation, the liniment would be colourless, or nearly so; but if the soap were kept for a sufficient length of time to cause the entire peroxidation of the iron, it would be of a dark sherry colour. Usually, the colour of the liniment would vary according to the degree of oxidation of the iron. The idea of colour was, he believed, so intimately associated with the characters of soap liniment, or, as it was commonly called, opodeldoc, that it was desirable to maintain this character as uniformly as possible, and this also would be accomplished by always using mottled soap in the dried state. Another curious fact, too, had been observed, that if the soap, dried and powdered, be added to the spirit as ordered in the London Pharmacopœia, there was not the same tendency to gelatinization in the liniment as was the case when the soap was first dissolved in the water by means of heat, and the spirit afterwards added.

A Member suggested that spirit of rosemary, made by distillation, would be better than that made, as directed in the present London Pharmacopœia, by simply dissolving the oil in spirit.

Mr. Morson thought, as far as related to the efficacy of the liniment, it did not signify whether it was solid or liquid, but it was certainly more convenient for dispensing in the fluid state, and therefore it was desirable that it should always be maintained in that state. Why not accomplish this object by substituting soft for hard soap?

Dr. Redwood thought there was one serious objection to the use of soft soap, which was, that it always contained free alkali, which was present in very variable proportions in different specimens. In fact, soft soap was never uniform in its characters and composition, in consequence of its not being separated from the residual alkaline liquor in the process of manufacture, as was the case with soda soaps.

A Member suggested that uniformity of colour in the liniment might be ensured by ordering white Castile soap.

Mr. Deane thought white Castile soap was not to be so much depended upon as the mottled sort.

Mr. Bartlett had found that a good soft soap and proof spirit formed a liniment that was nearly colourless, that always remained fluid, and that gave general satisfaction. He had never found that the absence of colour was objected to; on the contrary, many persons considered the absence of colour to be an indication of purity.

Mr. Bottle considered the thanks of the Members were due to Mr. Deane for the manner in which he had introduced the subject. He agreed with Mr. Morson that the characters which had been referred to in soap liniment were probably of little importance with regard to its efficacy as a liniment, nevertheless, it was very desirable to have such a preparation as was most convenient for dispensing and for use, and which would be uniform in composition and in appearance.

Mr. Deane very much objected to the use of soft soap, on account of it swant of uniformity. He thought if hard soap were used, it ought to be dried and powdered, this being the only means of ensuring uniformity even in this kind of soap. He thought also they would all agree that the quantity of soap, whatever the solvent may be, ought not to be greater than was consistent with the preservation of the liniment in a fluid state at all temperatures.

Dr. Redwood thought there was one other point to be considered with reference to this liniment, and that was, whether rectified spirit or proof spirit formed the best application for use as liniment. He had heard it suggested that proof spirit would probably form the best liniment, as it would not so quickly evaporate when rubbed on the skin.

Mr. Morson suggested that if it should be considered desirable to retain

colour in the liniment, it would still be a question whether the colour should be derived from the iron contained in mottled soap, or whether it would not be better to use white soap, and to add some colouring matter in definite proportion, so as to ensure uniformity of colour.

LINIMENTUM HYDRARGYRI.

Mr. Deane also directed attention to the formulæ in the London and Dublin Pharmacopœias for this preparation. There was a slight difference between the two formulæ, one ordering lard and the other olive oil, in addition to the mercurial ointment, camphor, and ammonia. In the Dublin process, in which oil was substituted for lard, the ingredients were directed to be mixed while a gentle heat was applied. The mixture when completed was uniform in appearance, and no separation took place afterwards. In the London process there were no instructions given for the application of heat, but without such application, and especially in cold weather, the ingredients separated to some extent after being mixed. In this process, as in the Dublin, the application of a gentle heat caused a more intimate combination to be effected, and the liniment then retained a uniform appearance. Only a slight amount of heat was required in either case, and it was necessary to be careful not to apply excess of heat so as, unnecessarily to dissipate the ammonia. The best method of operating was by means of warm water, to render the mortar to be employed just warm enough to reduce the lard or ointment to the consistence of thick cream. As soon as the combustion was effected the liniment should be put into a well-stopped bottle for preservation.

PHARMACEUTICAL MEETING, EDINBURGH.

A Scientific Meeting of the Pharmaceutical Society was held in 51, George Street, Edinburgh, on Thursday evening, 18th Nov., at 9 o'clock,

MR. JAMES ROBERTSON, PRESIDENT, IN THE CHAIR.

There was a very full attendance, including Professor Laycock, Dr. Seller, Dr. Cumming, Dr. Douglas Maclagan, Dr. James Young, Dr. Dubuc, &c. &c.

Mr. Robertson delivered the following

ADDRESS.

Gentlemen,—In taking my place this evening as your president, I beg to express my thanks for the honour thus conferred upon me for the second time. All or most of you may be aware that on the first occasion my health prevented me from attending to the duties of chairman, and this circumstance has been urged as a reason why I should undertake them again this session. I have done so, not that I felt myself by any means competent for the task, but from a conviction that the Pharmaceutical Society is an institution deserving the cordial support of every one connected with the business of Chemist and Druggist, and that it is the duty of every one of its members to do for it what he can. Seventeen years have now passed away since the formation of the Society, but instead of occupying your time in attempting to lay before you anything like a retrospective view of what has been done for the advancement of our position as Pharmaceutical Chemists during that period, I think it wise to draw your attention to the very able and interesting statement on the subject, by our Secretary Mr. Mackay, which you will find in the Journal for last month. Much has already been done for our benefit, but a great deal has still to be accomplished—many obstacles, doubts, and prejudices have been combated and overcome, but many are still in the field against us—we have too large a number of our own body yet to be convinced of the propriety of joining the Society—we have the objections or misconceptions as to our views by the Medical Profession—and, above all, we have the opposition, or perhaps the indifference, of the Legislature, arising, in a great measure, probably from so many Members of Parliament being ignorant of the aims and purposes of the Society, as well as of the important results which would arise not only to the profession but also to the public were they

to confer upon us such additional powers as would be necessary to work out fully the objects the Society have in view. Nothing is more likely to overcome this last difficulty (that is, the opposition of the Legislature) than numbers. We know that many of the best measures that were ever carried through Parliament had long to struggle against discouraging odds, but numbers and perseverance in a good cause prevailed ; and so it must be with ourselves—to succeed we must be, as a profession, unanimous. An earnest, intelligent, and numerous body of men engaged in a most important and responsible calling, cannot fail of obtaining ultimately from our rulers those additional powers which the Society so much require, and whereby they may be enabled to prevent any person from becoming a Chemist and Druggist ere he has by examination proved himself qualified for the duties implied in that position.

It is a very encouraging fact to know that so large a number of the leading Druggists of the day have become Members, not to mention the numbers who have joined as Associates and Apprentices. Moreover, when we consider that all this has been accomplished in the absence of any compulsory power, it proves very clearly how highly such an institution is prized, as being the means of raising the standard of education, as well as the Chemical and Pharmaceutical knowledge of all who would undertake the very responsible duty of dispensing medicine. Again, if we consider the many benefits we as a body have already derived from the efforts of the Council in London in warding off those Parliamentary enactments which would have proved very grievous not only to ourselves but also to the public, we must be constrained to admit that such services deserve not only our warmest acknowledgments of gratitude, but also to feel that it is a great privilege to be connected with such a body, and I hope I may be excused if I urge upon all who have not yet joined the Society the propriety of doing so.

It has often been stated, and with too much truth, that the Chemists and Druggists of this country are far behind the Pharmaciens of the Continent in point of scientific attainments. Let us not be discouraged by this fact—it is chiefly in their chemical knowledge that they so far surpass us, and the reason is obvious—every one of our foreign brethren is compelled to undergo a series of examinations before he is licensed to practise his profession. In other respects I hesitate not to affirm that in no country is the business of a Chemist and Druggist carried out to greater perfection either as regards accuracy and neatness in dispensing, or purity of the various drugs employed, than in our own, and if young men will engraft on this state of matters a good general education, and a thorough knowledge of Chemistry and Medical Botany, they may then occupy the satisfactory and proud position of being unsurpassed as Pharmaceutists anywhere. We have now entered on the seventh winter session of the North British Branch, and I feel justified in saying that we may fairly claim some meed of praise for what we have hitherto done for the advancement of the Society ; fortunately, we have associated with us as honorary Members several gentlemen who have most kindly favoured us with many able and instructive papers, which have proved a great support and encouragement to us, and I hope we may still occasionally have the benefit of their assistance. Many excellent papers have likewise been read by several of our Members, and I trust we may have a like assistance from them this winter, and I would also express a hope that some of our Associates will follow their example. And, as we have now the happy prospect of ere long obtaining a National Pharmacopœia, I think we would do well each and all of us to bring before the Society any remarks or information regarding the errors or defects of the present Pharmacopœia as may be worthy of notice, and which may prove useful to those gentlemen who have the laborious and important duty devolved upon them of compiling the new one ; and as the Pharmacopœia Committee of the North British Branch may have occasion to correspond from time to time with the Committee in London, I think it would be desirable for any one who has remarks to make not to wait for the evening meetings, but at once to convey their suggestions to our Secretary, Mr. Mackay.

All are earnestly invited to avail themselves as much as possible of our library, which now contains a number of useful books. Our museum is also increasing in point of variety and interest, and, in short, everything has been done to the full extent of our means and opportunities, and when I say this I should be greatly wanting in my duty were I not to state that in accomplishing what we have done we are deeply indebted to our Secretary, Mr. Mackay, who has acted the part of a skilful pilot, steering us clear of difficulties, and on many occasions keeping us afloat

when otherwise we might have gone ashore. In conclusion, gentlemen, let me hope that, with your kind assistance, this session may not detract from those that have gone before; and that a spirit of good fellowship may prevail, coupled with an earnest effort to accomplish as much for the general good as may be in our power, and should we succeed in convincing our younger brethren of the great advantage of cultivating their minds so that they may become intelligent and useful members of their profession, our labours shall not have been in vain.

The President having introduced Professor Laycock, he read the following paper:

ON THE NEW PHARMACOPŒIA; WITH SOME PRELIMINARY CONSIDERATIONS ON THE PAST AND FUTURE CONDITION OF BRITISH PHARMACY.

An Introductory Address, delivered at the first Scientific Meeting (Session 1858-59) of the North British Branch of the Pharmaceutical Society of Great Britain.

BY T. LAYCOCK, M.D., &c., &c.,
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INDEPENDENTLY of the commercial and merely professional interest which necessarily attaches to a new Pharmacopœia, the forthcoming official text-book of British Pharmacy is associated with considerations of unusual importance. It will be brought out under the authority of the first British Medical Council. Hitherto our Pharmcopœias have been English, Scotch, Irish: this will be national. Nay, since our great and growing colonies look to this country as the source of their science, literature, and laws, so their practitioners and chemists will look to our national Pharmacopœia as a safe guide in their vocations. Nor ought we to forget that our great empire in India is only the more closely bound to us by recent events, and that there, too, British medicine has triumphs to win. Hence the new Pharmacopœia will be, in fact, not so much national as imperial. But I might further add that, as natives of the British colonies and of India come in greater numbers every year to the medical schools of Great Britain, and especially to that of Edinburgh (for one-third of my own class at the University is either English or colonial), it is of no little importance to them to have but one official text-book to study in the place of three, while it is of still greater importance that it should be not only as near perfection as it can be made, but universally useful. So that when these gentlemen depart from our schools to exercise their art in their respective spheres of labour, or when our native-born students march with our armies, or migrate with their fellow-countrymen to the remotest bounds of the empire, they may all still bear with them, in its amplest meaning, the classic designation which the Apothecaries' Society of London have taken as their motto from Ovid—

"*Opiferque per orbem dicor.*"

Knowing the deep interest the Pharmaceutical Society must take in the forthcoming Pharmacopœia, and moved by such considerations regarding it as I have stated, I thought it would be a fitting subject for an introductory address. But before I refer to it more especially, I would premise a few remarks on the past and present position of Pharmacy and its relations to the medical profession in this country. I think it must be acknowledged that the art is a sort of human instinct. If it were not so, it would be hardly the pleasing pursuit some persons find it to be. I was honoured the other day, by being asked my opinion as to the value of a receipt for a hair-wash, which one lady of my acquaintance had sent to another, and I specially noted that the fair Pharmaceutical Chemist said, "I send you this receipt because I imagine you are as fond of messing and experimenting as I am." The "still-room maid" of large domestic establishments in this country derives her official title from the fact that she was the assistant of the lady of the house in her multifarious pharmaceutical duties at a time when the noblest woman in the land had her stores of "simples," "julaps," "waters," "robs," confections, and the like—all sovereign remedies for fevers, coughs, gout, hysterics, &c. And doubtless, when tea and coffee was first introduced, it fell to her department to prepare the decoction and infusion of the new herbs—a business still connected with her duties—besides that of helping the housekeeper to pickle and preserve. In the early period of medicine, when practitioners were few, and Apothecaries only to be found in towns, the still-room was an important part of a nobleman's house. I do not know if the ladies are as yet generally aware from what fœtid sources modern chemistry has extracted the sweetest and daintiest odours for their toilette tables, but I rather think the still-room

maid of the last and preceding centuries knew a curious medicinal secret or two of this kind. All flower-water was formerly considered "good against the gout, running gout, rheumatism, stone, stoppage of urine, &c., being very effectual;" and was known as the "*Aqua Arthritica.*" Its formula was "cow-dung, gathered in May, adding to it a third of white wine and then distilled," or, "fresh cow-dung and snails with their shells bruised equal parts, mix and distil in a common still." But there is in Bate's Dispensatory, by Salmon (1694), from which I have just quoted, a story of a female Pharmaceutist (who made the all-flower water) so curious, that I shall repeat it to you. "There was a certain woman who, from the most obscure fortune set up for a doctress, and undertook the cure of all diseases with this only remedy, or rather the same worse made; and from the state of a beggar became mistress of more than twenty thousand pounds. This she gave in all distempers and against all diseases; and so happy and successful she was that she cured almost all such who were given over by others for incurable, and it was rare that anything came under hand that miscarried; this was her excellent secret by which she did such wonders in the art of physick :—℞ Fresh cow-dung gathered in the morning, ℔xij.; spring or rain water, ℔xxx.; mix and digest twenty-four hours, let it settle, and then decant the clear brown tincture. It is, without doubt (continues Salmon), a good thing, and so much the better because of its general tendency, and being constantly used with such an approved success. By reason it is extracted from cow-dung, it has a pretty kind of sweet scent, as if it was perfumed with musk or some other odoriferous thing." So that the medicine was both cheap and pleasant. We may smile at this, but little more than a century has elapsed since Dr. Rutherford, a predecessor of mine in the University—indeed the first teacher of clinical medicine therein—prescribed cow-dung as an external application in cases of rheumatism treated in the infirmary. I have an authentic MS. of his clinical lectures in my library, and I find in the case of Janet McPherson, who had rheumatic fever, Dr. Rutherford remarked :—"I have ordered her a poultice of cow's dung, yn which I know no better medicine to reduce ye parts yt have been so much and so long distended, ye good effects of which I have often experience'd. I will mention to you but two examples of ys medicine's efficacy &c.: ye first was in ye case of David Hayburn, whose knee was much swollen and very stiff, and after trying many medicines without success, he at last regained ye use of his knee by ye use of ys medicine. I dont pretend to say yt ys will cure every disease of ye kind. I am not so sanguine in my expectations as to expect it would, especially if ye seat of ye disease should lay in ye ligaments of ye joynts. You likewise might see ye good effects of ys medicine in another case, a very dismall one; I mean in yt of Ann Gypson's, who had a hard swelling of her ancle," &c. Accordingly, the poultice of cow's dung abated the pain and swellings in Janet's case. Dr. Rutherford might have quoted the experience of the Eastern sages in the use of the remedy, for it is an approved article of the Hindu materia medica, and probably was such for many centuries before Hippocrates. In this country it is still a popular external application with the country folks, and although the still-room maid may have abandoned it as the main ingredient of all-flower water, it is still used by French chemists for the production of esprit des millefleurs. Now, Chemistry and modern experience afford us a clue to the persistent and continued use of this article of the ancient materia medica. I do not suppose it will have a place in the new Pharmacopœia, but phosphate of soda and benzoic acid, which are the essentially medicinal ingredients in medicinal cow's dung, probably will. Both are known to be useful remedies in gouty affections, and in the form of an alkaline lotion to inflamed joints, the phosphate would be useful externally as a sedative. This story of the beggar-doctress reminds me of a more modern instance of female pharmacy. Not long ago there was a celebrated woman in the midland counties, known as "the wise woman of Wing," who cured all diseases. Her practice was so enormous, that a railway company made a station for the convenience of her patients, who nevertheless had to wait for whole days before they could see her. Her "Catholicon" was a preparation of quinine, which was generally prepared in a large brewing-tub—a brew more costly, as to materials at least, than the Aqua Omnium Florum.

The old Pharmaceutical Chemists were exceedingly apt to dabble in the practice of physic, somewhat like some of their successors in modern times. Many surgeons also joined pharmacy to surgery and medicine, and hence at last a distinct class of general practitioners sprung up, especially in England, termed apothecaries. The

old apothecary was of course a famous hand at "messing and experimenting," and long after wholesale Chemists and Druggists were developed, an occasional country Surgeon still gathered simples and made his own extracts, and distilled "waters." A medical practitioner, with whom I am most intimately acquainted, was articled about thirty years ago, for special reasons, to two country surgeons (father and son), practising in a rich agricultural district in the north of England. The wife and mother of the house was something more than a sleeping partner in the firm, for she was not only a notable hand at distilling and making extracts, ointments, and plasters, but she knew the virtues of (and prescribed "in the absence of principals") sal polychrest, hiera picra, pilulæ cocciæ, the yellow basilicon, pulvis basilicus, paregoric, balsam of luccatelli ; all which, with not a few of a like era, were on the shelves of the surgery or shop in the back yard. The practitioner to which I refer has a pleasant reminiscence of his excursions as a student for simples, and of the "messing and experimenting" which followed; varied in winter with a day of fly and tackle-making, for the coming fly-fishing season, or a stolen gallop after the hounds. He could even now go direct to the shady lane, where he cut down the dark-green belladonna, or to the hedge-row, where towered the dark-spotted stem of the hemlock, with its bright sap-green leaves ; or to the heathery upland, where the elegant foxglove waved in the breeze, or to the sunny, stony bank, covered with the hairy-looking dingy henbane ; or to the wide pasture, studded with patches of ragged-looking colchicum leaves, which the numerous cattle had carefully left untouched. Then, in spring, there was the warm bank, where he gathered the violets from which he made his syrup of violets (for, in the country, oil of almonds and syrup of violets are popular baby-stuff) ; and in summer, the corn-fields, brilliant with red poppies, fit for making the syrup. Nor did he forget to gather rose-leaves and elder-flowers, and pennyroyal, and distil and bottle the waters thereof. Dried powder, extracts, tinctures, distilled waters, were all thus duly made at home. There was digitalis powder, I know, of a perfect green colour, and extract of hemlock as redolent of mice as Battley's prepared *in vacuo*. The only "messing and experimenting" which failed, was an attempt to convert juice of white currant into prime champagne, by first removing from it the citric acid. Whether any one has since carried out this brilliant idea, I don't know, but at the time I allude to, it was thought by the projector that failure was only due to the fact, that a lady-assistant attracted the attention of the young operator too much at a delicate stage of the process. Of course, I am not at liberty to mention names and places, but you may rely upon the facts being as authentic as mere memory can make them; and I may add, that since one of the most distinguished of my predecessors in the chair of the Practice of Physic was, at the outset of his career, a country surgeon and apothecary, I am not ashamed to confess, in presence of Professor Cullen's pestle and mortar, which is placed before you, that my own early experience, as a medical student, was exactly like that of the medical practitioner to whom I have referred. And I venture to think, if your excellent President or Secretary, or Messrs. Duncan, Flockhart, and Co., would give me a month's trial, they would find me to be a useful assistant.

The connexion of medicine with surgery and pharmacy has been a fertile subject of discussion and discord in the profession. The old grand academic physicians looked down upon both with contempt, and sedulously excluded practitioners of midwifery, surgery, and pharmacy from their society. The surgeons and apothecaries, on their side, were by no means reluctant to engage in controversy, and stand up for their rights. Hence the annals of our Colleges are full of details as to the struggles for privilege and monopoly which were made on both sides. The two Royal Colleges of Physicians of London and Edinburgh were, from an early period, the exponents of exclusive views, and not only solemnly required their fellows to abstain from surgery, midwifery, and pharmacy, but refused to admit any to their fellowship who had, at any time, practised them. Those practitioners, however, whose early training (as in Cullen's case) had brought them into immediate contact with the people at large, and more especially in thinly populated dirtricts, knew well that such severance was impossible, and that if the attempt were rigorously carried out, could only end in the practice of physicians being restricted to the wealthy class, and to towns, while men of inferior education and literary attainments would necessarily become the physicians of the great body of the people. Such, in fact, was, in England, the final development of their principles, when, in 1815, the College of Physicians of London surrendered to the Society of Apothecaries of

London the educational control of the entire body of General Practitioners in England—men who are virtually the physicians of the English people. In Scotland, the opposite result took place. Cullen, and the first Munro, joined the College of Physicians of Edinburgh in 1756, and, in a few years after, united with Drs. Thomas Young, Ramsay, John Gregory, Joseph Black, and James Hay, in an opposition to the exclusive regulations of the College. The contest was carried on, for many successive years, with varying and alternate success, until, in 1788 (when Dr. Hay was President), the liberal party was finally victorious ; and, on the proposition of Dr. Cullen, the late learned and accomplished Dr. Charles Stuart, who hitherto had been debarred admission by the operation of the exclusive law, was admitted a Fellow. Since this date, no restrictions have been placed on the practice of the Edinburgh Fellows.*

Perhaps it is to this step more than to any other that we owe the high development of pharmaceutical science, and that general separation of it from the practice of medicine in Edinburgh, which the advocates of the exclusive laws referred to, really so much desired. For, by breaking down the wholly conventional line of demarcation which was drawn between the practice of physic and of surgery and midwifery, the physicians became dangerous rivals of the surgeon-apothecaries for the general practice amongst the middle classes, and the latter were thus gradually led to assimilate themselves more closely to the physicians in titles, education, and mode of business, and more especially to dispense with the shop as apothecaries. Thus it has happened that in Edinburgh, not only is pharmacy separated from practice, to the great advantage of pharmaceutical science, but the standard of education and the social position of the general practitioner has been also raised.

Looking at the probable working of the new medical bill, I confidently hope that a change equally advantageous to pharmaceutical science and to the medical profession will take place rapidly in England. The recent enactment places our Scottish graduates in such a position, that henceforth they may legally practise any or all the departments of practice in which they are educated. It may be true that without the apothecaries' licence they cannot charge for the mere drugs supplied to patients; but as they can recover reasonable charges for attendance on those to whom the drugs are supplied, this is not a heavy grievance ; indeed, perhaps it would be rather advantageous than otherwise, for such disqualification would only hasten the extinction of the race of apothecaries, and develop a more able class of physician-surgeons, who will look to the chemist to supply his medicinal agents in the mode most convenient and advantageous both to patient and practitioner. Further, it is said that the College of Physicians of London is at last being actuated by the same liberal principles which were introduced into the Edinburgh College a century ago by Cullen and the first Munro. If this be the fact, and those principles take effect as they ought, it cannot be doubted that the influence on Pharmaceutical Chemistry will be great. For the College of Physicians has powers over England (perhaps throughout the empire) possessed by no other medical corporation, and may, if it wields them in a liberal spirit and with a wise vigour, both rival the Colleges of Surgeons, and draw to itself all the influence of the Society of Apothecaries, and so replace it as the centre and life of the great body of physician-surgeons of England. That would be a remarkable turn in medical politics, for under such circumstances the Society of Apothecaries of London and your own Pharmaceutical Society would soon be in a position to amalgamate, and thus Pharmaceutical science itself would receive a new and vigorous development.

In thus predicting and hoping for the separation of practical pharmacy from medical art, and a return to the unity of medicine, I would wish to be clearly understood as in no degree disparaging the dignity of pharmacy or the value of pharmaceutical knowledge to the practitioner. On the contrary, I hold that that knowledge is a most essential element of medical art, and that no physician is complete without it. It is his lot to be *opifer per orbem*, a truly catholic and universal helper, and although in a large town he may indulge in all the appliances and means which a division of labour supplies, he should nevertheless be qualified to act as herbalist, chemist, cupper, nurse, and doctor at once. His duties may unavoidably be those of the Man of Ross:—

* Address delivered at the opening of the New Hall of the Royal College of Physicians of Edinburgh, Nov. 27th, 1846, by William Beilby, M.D., President.

"Is any sick? The Man of Ross relieves,
Prescribes, attends, the medicine makes and gives."

Nay, I am not sure whether this completeness of knowledge does not give dignity and grandeur to the professional character, by implanting a manly feeling of independence. Thus armed at all points, the practitioner has a mind unfettered by conventionalities, and a heart for every fate. And certainly, it may be observed that, while those gentlemen, whose hands were never soiled by petty surgery and pharmacy — who, like Shakspeare's fop, object to "slovenly unhandsome corses" and "villainous saltpetre"—are the least successful in practice, they are often the most restrictive and retrograde in their views of medical polity. On the other hand, pestle-and-mortar men, like Cullen and Joseph Black, have made themselves known in the world by a large success, and have persistently advocated medico-political principles and changes, the good effects of which we can clearly recognize in our own time in a greater development of all branches of medical art, and in a more cordial union amongst those who practise them. And this credit is due also to the Apothecaries' Society of London. I am therefore quite prepared to maintain, on the substantial grounds of a well-tried experience, that practical pharmacy ought to be an essential element in the education of the medical practitioner, and that the practice of it by him, wherever the state of society calls for it, is worthy his position as a professional man, and ought only to add to his dignity by so much as it increases his usefulness.

I must, however, further remark, that this change in the pharmaceutical position of the profession will be all the more beneficial and extensive in proportion as the Pharmaceutical Chemists conscientiously restrict themselves to the duties for which they are fitted, and seek not to perform those for which they are unfitted. I say conscientiously, for I believe no parliamentary enactment can restrain the Chemist and Druggist from engaging in the practice of medicine, surgery, and midwifery if he think fit to evade the law. But I would appeal to the judgment of all of you, whether there is not a great depth of moral turpitude in that man who ignorantly, and for the sake of mere gain, presumes to tamper with the health, the ease, and even the life of those who come to him for temporary relief? Pharmaceutical chemistry is a department of medicine, not medicine a branch of pharmaceutical chemistry. If a Chemist desires to treat disease as a vocation, let him pursue the necessary studies and have his knowledge tested by the appointed examiners. These duties completed, he may be honestly and lawfully a medical practitioner, and in an open shop if he pleases. And I don't know why as such he may not honourably and usefully administer to the wants of that large class of the numerous poor in our large towns, or in thickly populated districts, who can afford to pay a few pence only and no more, for advice and medicine.

Of course, the Pharmaceutical Chemist cannot be expected to sink his duties as a man in the conventional restrictions which a division of labour imposes. Cases of urgency may occur in which he may help a suffering fellow-creature on the spur of the moment; but there is a marked difference between such medical aid which need only be temporary, and the continued treatment of the case as the medical adviser. A sense of honour ought always to forbid the latter course.

We will now examine a few questions relative to the forthcoming Pharmacopœia. And first, with reference to the form, let us ask in what language should it be written? My vote is for our own English tongue, except as to the formulæ and names. It can be translated into Latin, as it can, and will be translated into French and Hindustanee; but I cannot conceive any sufficient reason for the continued use of a dead language when our own is as copious as the Latin, and even now is spoken over a larger space of the world's surface than ever the Roman speech was heard. If this be so now, how much more widely will it be a vehicle of thought when our colonies have grown up into populous empires?

2. It would be well, however, with a view to uniformity of pronunciation everywhere, if a key to the proper sound of the technical words used were added to the Pharmacopœia. Curiously enough, this is no new thing in Pharmacy. In 1688, James Shipton, a London apothecary, published in Latin the famous *Pharmacopœia Bateana*, to which he added an "*Orthotonia Medicorum*," or correct method of pronouncing words usually, from ignorance or bad habits, wrongly pronounced by the apothecaries. I am satisfied every Pharmaceutical Chemist, whether at home, or in

the colonies, or in the United States, would hail such an addition to the Pharmacopœia as a great boon.

It is a curious fact that some of the modes of pronunciation thought vulgar at the present day are in truth quite correct, and the supposed correct method is a corruption. Thus we speak and write of sĕnna, but the old country surgeon to whom I referred always spoke of sēna. This is also the popular pronunciation. Now Rhases, Actuarius, and others of the same era, wrote the word *sene*. Old James Shipton seems to have thought it unnecessary to give the orthotony of the word in his list, but he gives the spelling with one *n* in an example to one of his rules, "Sena Alexandrīna, Manna Calabrīna," as if the *e* were long.

3. The forthcoming Pharmacopœia should be published officially, in a handy size, at the lowest possible price. The demand will certainly be large, and a quick sale may be relied on. Hence, after paying those gentlemen handsomely to whom the editorial duty may be entrusted (as they surely ought to be), it will be possible to sell the work at a low price in editions on good paper, and on inferior paper at prices that would defy competition, even in the United States.

4. Next, with reference to the plan. It is plain that uniformity of weight and measure and strength is a primary object. I presume, therefore, that no change will be made in those particulars as to which uniformity exists. We shall still use the imperial wine pint, with its subdivisions, and the traditional apothecaries' weight; and if preparations which it is resolved to retain are of a uniform strength and composition in the three Pharmacopœias, it is to be hoped that no mere love of change will lead the compilers to alter the composition or mode of preparation of those. I rather think, however, that the great difficulty will be found in the selection and arrangement or classification of the materia medica, and the compounds thereof. A Pharmacopœia necessarily reflects the existing state of opinion and knowledge; and as these vary from time to time according to various circumstances, a comparison of the past with the present opinions will indicate the changes which have taken place, and consequently the changes that will probably be found in the new Pharmacopœia. I shall not attempt this comparison on the present occasion, but content myself with indicating one or two leading points that require attention.

1. The use of articles of the materia medica varies according to caprice, accidental circumstances, or "fashion," as it has been termed. Now experience shows very amply that this cause of variation has caused drugs of the highest therapeutic value to be disused. The Hyoscyamus Niger was most probably naturalized in this country (as my learned friend, Dr. Adams, of Banchory, thinks) by the Romans, a proof of the estimate they put upon it as a medicinal agent. The Hyoscyamus Albus has been a valued remedy since, if not before, the age of Hippocrates. Yet Dr. Adams says* "that about 100 years ago, the henbane had wholly disappeared from the dispensatory. Thus Quincy does not treat of it at all, and Lewis represents it as a medicine which had been deservedly expelled from practice." The pharmaceutical history of antimony is curious in this respect. In 1566 the Supreme Council of Paris forbid its use, and Bernier was expelled the faculty of medicine, in 1609, for having administered it to a patient. In 1650 a new law repealed that of 1566, and antimony was restored to favour; while in 1720, the French Government actually purchased from a pupil of Glauber's, named La Legerie, the secret of an antimonial preparation, called Panacea Glauberiana, afterwards known as the Kermes mineral. Mercury, so important a drug in modern practice, in ancient times was "scarcely used for medical purposes," says P. Ægineta, "being deleterious." In more recent times, Cinchona bark offers a well-known and very remarkable illustration of the changes in the use of drugs, caused by prejudices and caprice. Thirty years ago the use of oil of cod-liver would have been classed with such remedies as a fox's lung or viper's fat. When, returning from Germany about twenty years ago, I introduced this article into practice (chiefly in cases of chronic rheumatic gout, in which it is a valuable remedy), I had to direct the patient how to get the oil from cods' livers, which were obtained direct from the fishing-boats at Scarborough. There was no oil fit to use medicinally, to be got from the shops. Yet it is a popular remedy, of great traditional antiquity, and I need not say is sure to have a place in the new Pharmacopœia.

2. The mode of administering remedies has changed so much, that the old plan of

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* *Translation of Paulus Ægin.*, vol. iii., p. 387.

endermic medication is almost wholly excluded from the Pharmacopœia. We have a few liniments, ointments, cataplasms, and clysters left; but they are more like fossils of the old "Compound Externals," than anything else. Yet there was hardly an object to be attained by the internal administration of drugs, which the ancients did not aim at by their external application; and succeeded in, too, with much advantage to the overworked stomach of the patient. A hip-bath of oil, albeit oil of the fox, was not improbably found to be sometimes as useful to arthritic patients, as P. Ægineta states—namely, that if they are put into it for a considerable time, it removes the complaint entirely. Not wishing to load the intestines with irritant drugs, in a case of stricture of the rectum, under my care, I tried a purgative cataplasm or epithem to the abdomen (or navel), like that recommended by this writer, and it answered remarkably well. I have applied castor oil to the abdomen with similar results, in cases in which the slightest excess in its operation would have been dangerously debilitating. I can confirm the experience of Professor Trousseau and others, as to the diuretic activity of squill and digitalis, applied in like manner. The external application of quinine, opium, arsenic, &c., is well known and valued. Why, then, should we not have a class of epithems?

In this respect the modern practitioner has a great advantage over those of past times in the gutta-percha tissue. I was, I believe, one of the first to introduce its use into practice nearly twenty years ago, for the purposes of endermic medication, for which it is much better fitted than oiled silk, from the simple circumstance that it resists the action of many chemical remedies. Thus I have by its means applied iodide and bromide of potassium and chloride of sodium endermically to bronchoceles, to enlarged strumous glands, and even to the scalp in cases of strumous idiocy, with both comfort to the patient and marked success in the treatment. Amongst endermic remedies I hardly think that suppositories and clysters will be neglected, but the class of tents are entitled to a re-consideration as means of endermic medication. The old turundæ acousticæ are ear-tents for this purpose of a more artistic construction than a twist of cotton-wool. And perhaps even the "amulet against pestilences" had a virtue in them as endermic medicants in addition to their psychological influence as antidotes to depressing fears. The febrifuge powers of arsenic are well known when used as a remedy, but its fumes also are antidotal, for in Cornwall the arsenical fumes from the mines are said to "kill" all the fevers in malarious unhealthy districts. But arsenic was probably applied endermically in the form of vapour in these amulets, and thus had an influence in counteracting the action of the miasmata which is strongly predisposed to attacks of pestilential fevers. I give you the formula from Salmon's edition of Shipton's Bates "℞ Auripigment (orpiment) ℥iss., angelica roots ℥vj., mucilage of gum tragacanth q.s., mix and make a paste, of which make amulets, No. xij. of a globe-like form, which roll up in silk and hang against the region of the heart." These amulets are said to have produced deleterious effects when worn for the purpose specified. Crato observed an ulcer of the breast, and Vernascha violent pains and syncope to follow their use.* Old Salmon says, "Paracelsus, Crollius, Hartman, and others, are of opinion that there is a mighty force and virtue in such like *amulets*, made to defend against the infection of the plague. I will not say much to the matter, but leave every one to use their own freedom. However, this, I will say, that if my own life lay at stake, I should rather trust to some known and approved inward specifick antidote, than to all the force of amulets in the world. Tho' if the philosophick reason of the thing be considered and enquired into, there may be much more in it than many are aware of." Between 1694 and 1858 we have advanced to a "philosophick reason of the thing," and think the arsenic, being slowly vaporized by the heat of the body, is absorbed by the skin, and so acts, as well as the inward specific antidotes or febrifuges, quinine or arseniate of potass—for arsenic may be absorbed in poisonous doses by the unbroken skin. Let us turn to another circumstance influencing the selection of remedies.

3. The ancients used, what we consider, very nauseous and disgusting remedies, and we have, therefore, neglected them; but they had their reasons: the main one being, probably, that beneficial effects resulted from their use. We have seen that one of this class of remedies (cow-dung) actually contains valuable drugs. I believe this will be found true of other remedies drawn from the animal kingdom. The Hindu

* Paris's *Pharmacologia*, 7th edition, vol. ii., p. 100.

physicians give the ashes of bones, mixed with other medicines, in nervous diseases, and in those of children;* that is, the salts of lime. Now, it is only lately that these salts have been introduced into practice in this country for similar diseases. Amongst the "quiddonies" in Bate's Pharmacopœia is a "gelatina corroborans," formerly prescribed in cases of phthisis. It is made from sheep and calves' feet, a sea-horse pizzle, the raspings of ivory and of hartshorn, together with roots of satyrion, ladies' mantle, and daisies; a curious compound to modern eyes, but really offering an excellent mode of administering the animal salts of lime in cases of tubercolosis. Another formula of this kind—a "cordial for consumptions"—is so elegant and pleasant that, with a slight modification, it might well have a place in the new Pharmacopœia. ℞ Ivory, ʒiss.; crab's eyes, prepared pearl, of each, ʒj.; oil of cinnamon, gtt. vii.; treble refined sugar, dissolved in red rose-water, ʒxvj.; mix and boil S. A. Dose ʒss. to ʒj., either alone, or in any proper vehicle, three or four times a day. Here, again, we have the animal salts of lime, which modern experience has shown, after long neglect of them, to be efficacious tonics and alteratives in struma, phthisis, strumous dyspepsia, infantile debility, and the like. I could mention a whole series of remedies of this class, amongst the most famous of those included in the old Pharmacopœias and Dispensatories, and which have fallen into unmerited neglect from the disgusting ideas associated with them, or from mere caprice. Thus the incontinence of urine observed in delicate children was treated by a *diatrachia* made up of raspings of ivory and tooth of sea-horse, and windpipes of sheep and capons. The ancient much-valued bezoar is a remedy into the composition of which the ammoniaco-magnesian phosphates largely entered, and these, perhaps, might be usefully administered when animal salts of lime are indicated. The *Bezoar animale* was an artificial substitute, made of calcined hartshorn. To this class belong Lemnian earth, cuttle-fish bones, bone of a stag's heart, snails in their shells, red coral, crabs' claws, lapis manati, elks' hoofs, vipers' skins, and human bones. King Charles II. paid one Goddard £1500 for the receipt of a preparation (ammoniacal in its nature) obtained from human bones; and Salmon says he had made a long series of experiments with them. Man's bones calcined and added to hermodactyls (or colchicum), senna, scammony, and turbeth, made a powder "good against the scurvy, dropsy, jaundice, and king's evil." Sponge dried and powdered was the basis of the "Pulvis ad Struma," a powder against struma. The practitioner to whom I have referred diligently dispensed boluses of burnt sponge for bronchocele long before iodine and bromine were discovered; and in the Pampas of South America, where goitre is prevalent, the remedy—a so-called goitre-stick—is nothing more than the thick stem of a sea-weed. Now in all these instances (and they are only a few of the many I could mention), we, who have the advantage of all that wonderful knowledge which modern chemistry supplies, can readily recognize an efficient medicinal agent, independently of the disgust or superstition connected with the preparation, and can see that if they were rejected on the ground that they were simply fanciful, disgusting, or superstitious, a class of useful remedies would be lost.

4. But what rule is to be followed in the selection of articles of the materia medica? Now I am inclined to think that the time has come for a change in the method hitherto followed, and which has consisted simply in adopting popular new remedies, and omitting those which caprice, or fashion, or new rivals have caused to be neglected. I think it is now possible to generalize the accumulated experience of times immemorial, and establish a philosophical analysis and classification of medicinal agents, so as to afford greater choice to the practitioner. With every successive edition of the Pharmacopœia the number of officinal drugs and preparations has diminished; and if we were to limit the list in the new edition to those most in use, we might reduce the number still more. Mr. Mackay has had the goodness to analyze some prescriptions for me. He has noted the preparations that enter into a prescription for a mixture, pill, powder, lotion, and ointment, made up in each week of the 52, or 260 in all. I find, on an analysis of his statistics, that 200 preparations were used in the dispensing of these, of which 12 were used from 28 to 14 times, 89 from 12 to 6 times, 74 from 5 times to twice, and 25 once only. Of individual drugs, I find that mercury was prescribed in one form or another 101 times, opiates 93, chalybeates 73, cinchona, quinine, and its salts 49, rhubarb 48, iodine 41, aloes

* Dr. Wise's *Commentary on the Hindu System of Medicine*, p. 117.

34, zinc 32 times. These represent the most popular articles of the Pharmacopœia, and show what a reduction is possible. That this reduction of the materia medica is not approved in reality by the public or profession, is shown by the fact that every new Pharmacopœia is followed by its "Supplement," and by a "Dispensatory," in which discarded or unrecognized articles of the materia medica find their place. But why not make the new Pharmacopœia a philosophical Dispensatory also, so that at least the Supplement may be dispensed with? I think, in consideration of the fact that it will be used in every clime, and wherever British science, language, and laws have penetrated, it should contain the materia medica so arranged as to constitute a universally useful volume, and be as complete in itself as the present state of our knowledge permits. And this I think might be done, or attempted, by a new examination and arrangement of all known medicinal agents and compounds, according to well-established general principles of therapeutics and combination—such as, for example, might be done with the salts of lime in the instances just referred to. In this way the soil and fauna of each country and climate would supply their own indigenous remedies; and thus their virtues would be better known and estimated, while, at the same time, a higher value and a greater importance would be given to the interchange of remedies between countries geographically distant. I have in my eye, in especial, the future condition of our empire in India, as regards materia medica and pharmacy. British medical science will have a powerful influence on India, being now taught there in native medical colleges to intelligent natives. These men not only read English well, but write it so correctly, that it is occasionally difficult to detect a foreign idiom. Now the native Hindustanee pharmacy is in much the same condition as our own was 150 years ago, both as regards the materia medica and the pharmaceutical processes—that is, it contains a large number of useful remedies, superstitiously, cumbrously, and ignorantly prepared. But the sort of analysis and classification to which I allude would render the work of reform and progress much easier, by grafting it on the native materials and doctrines. It is remarkable to observe the unanimity of opinion between the East and the West, the ancient and the modern, as to the virtues of certain drugs. Take arsenic for an example. The Hindu physicians consider the yellow orpiment as a very valuable medicine in fever and in black leprosy. They say it also improves the complexion; and this reminds us of the recent controversy as to the Styrian arsenic-eaters. We know how useful a remedy it is, in like cases, in modern Europe. I would not, however, have you limit your consideration of the future spread of British pharmaceutical chemistry and materia medica to India. We have had a medical student from China here, a graduate of our University. British medical science, we know, is gradually taking root in China, and ere long we may expect intelligent Chinese to come to Europe in greater numbers for the purpose of scientific study. Now I think we ought to pave their way to us by examining and analyzing Chinese materia medica and pharmacy, in the same way as I suggest we should do for Hindu medicine. These remarks, I need hardly add, apply with even greater force to the Japanese—if recent reports as to that people be correct—who seem to be fully ripe for the reception of all European knowledge. Nor should we wholly forget that Africa as well as Asia has a future in store for her; and I may add that an intelligent native from the West Coast of Africa, who speaks English remarkably well, is at present a member of my class in the University.

5. There is one other point I would suggest for consideration by those to whom the compilation of the new Pharmacopœia will be entrusted, and that is the propriety of supplying the public with officinal formulæ for popular use. I am well convinced that it is a question requiring the greatest caution in its discussion and solution, and I know it would not be difficult to adduce strong arguments against any such step. Nevertheless, I think the balance of argument would be determined in its favour by the sound, simple rule of policy—of two evils take the least. There always has been, and I think no one will deny there always will be, a demand for popular remedies. Every man and woman of intelligence ought, in fact, to know so much of medical art as to be able to render medical aid in cases both of a simple character and of emergency. In the former, because no sensible person likes to be always running to or for a "doctor;" in the other, because medical aid is not always at hand. Then there is the instinct for medication active in most men, and so active in some, that the practice of medicine is followed by them with much the same feelings of pleasure as the study of botany, geology, and the like, by others. In short, the

people always have had popular medicines, and always will have; and if remedies be not supplied to them officially and with the stamp of medical authority, they will buy drugs from the quack with the Government stamp.

Now popular medicines have supplied the Pharmacopœia with its best compounds; it is a fact, too, that these are the drugs and combinations of drugs which most especially have withstood every vicissitude of political and scientific change. I will mention aloes and its compounds as an illustration of this kind. There is hardly a "family pill," or "antibilious pill," or "stomachic" remedy which is devoid of aloes, while in the most popular officinal compounds of the Pharmacopœia it is one of the most active ingredients. Now, probably, the use of this drug is of the remotest antiquity, not only internally and for the same purposes as those for which we use it now, but in a mode almost altogether if not wholly lost—namely, externally. It was formerly used as an application to abscesses, ulcers, and ill-conditioned sores. Celsus prescribes it as an eye-wash, and it is used in India for this purpose at the present day. One of the most ancient formulæ for its internal use is the compound powder termed hiera picra—the holy or sacred bitter—an Æsculapian, or temple formula. That named after Galen contained, besides yellow aloes, various aperient, aromatic, and bitter ingredients, to the number of eleven—such as cinnamon, cardamoms, crocus, cassia fistula, mastich, asarum, wormwood. It is a remedy well known, even to the poorest people, who term it hikery pikery, or hickerry pickerry. In the Edinburgh Pharmacopœia, it is the "species hiera picra" of Galen, but the formula is simplified, so that besides aloes, there are only cinnamon, asarum, crocus, spikenard, and mastich. In the London Pharmacopœia of 1746, the number of ingredients was still further lessened, and although it still retained its ancient name, it was reduced to the compound subsequently known in more modern Pharmacopœias as the pulvis aloes cum canella; the ingredients being aloes and canella only. It may be doubted, however, whether this simplicity of composition was an improvement; for, although a strong advocate for simplicity in extemporaneous prescriptions, I am by no means certain that we should follow the same rule in these officinal compounds, and I really think that the original hiera picra of Galen was a much more useful formula than its modern descendant, the simple aloes and canella. I need only refer to the crocus and the wormwood as powerful adjuvants. But this same aloes appeared in another form, with very similar accompaniments, viz., the tinctura sacra—the parent of our tinct. aloes comp., and with the same uses. We also have it in the once popular decoct. aloes comp., the pil. aloes cum myrrha, the pil. cocciæ, the pil. rhei comp., &c. Now, in the face of all these facts, I think it is worthy consideration (and I insist on no more than this), whether a drug so established in both popular and professional esteem might not in some of its compounds—as the hiera picra—have the honour of being raised to an officinal popular remedy? I am pretty sure that the sale of such a compound would be considerable, and would interfere beneficially with the sale of quack compounds containing nothing else than aloes and its established adjuvants, but sold at the cost of a profusion of falsehoods and systematic frauds.

6. I referred incidentally to the simplification of these old popular formulæ, and questioned its propriety. Amongst the most ancient and most valued of these were the Mithridate, or Mithridatum Damocratis, the Theriaca Andromachi, the Dioscordium, the Philonium Romanum, and others. There is a principle observable in the composition of these, which we find operative in nature in the constitution of mineral waters, and even in living organisms—namely, the multiplication of small doses of numerous ingredients that are similar, albeit not identical in character and virtue. Now the tenacity with which these remedies, in some form or other, have held their ground, is a proof, I think, that the principle of complex medicinal compounds is not altogether to be neglected. Take the Philonium as an example. It derives its name from Herrennius Philo, a native of Tarsus, who flourished about the third century before Christ. It underwent various modifications in successive Pharmacopœias, but it is still an officinal compound, in the simplified form of Confectio Opii; now, it is true, almost dropped out of use, but simply because an improved chemistry has given us the various salts and preparations of morphia. Would it not be well, nevertheless, to reconsider such a formula, as well as others, and see whether modern chemistry could not supply the really essential ingredients of these multifarious compounds, in a form more adapted to modern requirements, and thus restore to use some very valuable remedies? I may

add, that I am by no means singular in these opinions—the late Dr. Paris and others have mooted them.

7. What will be done as to the selection of *new* popular compounds of this class? For example, we know what modern chemistry has done for us in supplying aërated and factitious mineral waters: will these find a place amongst our officinal compounds? But I could multiply questions like these to an almost indefinite extent; and I must now conclude with the remark, that in this address I have only attempted to suggest some of the future bearings of pharmaceutical science, and to hint at a few of the problems which the compilers of the forthcoming Imperial Pharmacopœia will have to consider; with perhaps a hint, too, of the criticism which awaits their completed work—and which every successive Pharmacopœia, I may add, has had to encounter.

The Chairman moved a cordial vote of thanks to Professor Laycock for his admirable address. The Society felt much indebted to him for the very kind and ready manner in which he had responded to the request of the Council in giving them such an able and instructive address. When the difficulties attending the formation of a new National Pharmacopœia had been overcome, he was quite sure both the profession and the public would have cause for thankfulness, because the completion of such a work would lessen the chances of accident.

The vote of thanks was carried unanimously, and with acclamation.

Professor Laycock, in returning thanks, said he felt it an honour to co-operate with the Society in doing anything to advance Pharmaceutical science, and he could assure the meeting that he had many pleasing reminiscences and associations connected with this subject, and it would at all times afford him much pleasure to forward the interests of such a Society as this, formed as it was for the promotion of the science and art of Pharmacy.

The Secretary then read the

REPORT OF THE PRIZE COMMITTEE.

Although two prizes were offered at the close of last session for the best essays on any chemical or pharmaceutical subject, the Committee regret to say that only one paper has been lodged with the Secretary. The subject treated is "The Best Mode of Preparing Tinctures," but the Committee have decided that this production does not merit the prize. The author has confined his subject within such narrow limits as to prevent his remarks being of any assistance in this important department of pharmaceutical manipulation. While, therefore, they cannot award the prize, the Committee think that some work on Chemistry may be presented, to show their appreciation of the desire on the part of the author to meet the wishes of the Council by the production of the paper already referred to. The Secretary has been requested to open the sealed envelope and communicate with the party direct.

The Secretary mentioned that the Council were much disappointed in the want of interest displayed by the Associates and Apprentices in not competing for the prizes, although the whole summer had been given, during which essays might be prepared and sent in for competition. He further stated, that as competition would still be open to Associates in England as well as Scotland, the Council hoped during the present session some effort would be made to obtain one or both prizes. Papers will be received up till the 15th March by the Secretary, and, as before arranged, the Council will admit papers on any pharmaceutical or chemical subject, and will award the prizes according to the merits of the essays.

Catalogues of the Library were then circulated, and the meeting adjourned.

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

The First Meeting of the Tenth Session was held in the Royal Institution, Colquitt Street, on the 28th October,

MR. H. S. EVANS, PRESIDENT, IN THE CHAIR.

The following gentlemen compose the Council for the year 1858-59:—Mr. H. S. Evans, President; Mr. H. Coupland, Vice-President; Mr. J. Shaw, Secretary; Messrs. J. Abraham, J. Dutton, J. B. Edwards, C. Jones, N. Mercer, A. Redford,

T. D. Walker, W. Wright. Teacher of Practical Pharmacy, J. B. Edwards, Ph.D.; Librarian, Mr. T. D. Walker.

Messrs. Duckworth, Bennett, Jackson, and Hocken, were elected Members of the Association; and Messrs. Lord and Syers Associates.

The following books, recently purchased by the Society for the library, were laid on the table:—Graham's *Chemistry*, second volume, Redwood's *Supplement to the Pharmacopœia*, Beasley's *Pocket Formulary*, Beasley's *Receipt Book*, Lyell's *Principles of Geology*, Phillips's *Introduction to Elementary Mineralogy*.

The SECRETARY announced the following donations to the library:—A pamphlet *On the Scope and Tendency of Botanical Study*, from the author, Dr. Collingwood, lecturer on botany at the Liverpool School of Medicine; also the *Introductory Address* (Chemical Section) of Sir J. F. W. Herschell, delivered at Leeds, from the same gentleman. Some African bee's-wax was presented to the museum by Messrs. Wright and Lockhart, through Mr. Guy. The thanks of the meeting were unanimously passed to the donors.

The PRESIDENT then read the usual annual Address, congratulating the Society upon the continued prosperity in all its branches, commenting upon the proceedings of the past session, and urging the importance of greater self-reliance for the future. After which,

Mr. MERCER exhibited some gas-burners made from steatite or soap-stone, a substance which has, within the last few years, been used both on the Continent and in America for that purpose. The property which renders it valuable for gas-burners is, that it slightly contracts with heat, and never becomes rusty or furred. The holes, consequently, cannot increase in size with constant use, nor do they ever give irregular or smoky flames, as is the case with ordinary metallic burners.

The thanks of the meeting were voted to the President and Mr. Mercer, after which the proceedings terminated.

Royal Institution.

The second meeting of the Session was held Nov. 11th,

THE PRESIDENT IN THE CHAIR,

The attendance was very good. Messrs. Milne and Dooby were elected Members.

The SECRETARY announced the following donations:—To the library: *Transactions of the Literary and Philosophical Society of Liverpool*, from the Society; *Pharmacologia*, published in 1693, from Mr. C. Jones; *The Student's Laboratory Guide* (three copies), from the author, Dr. Edwards. To the museum: A beautiful specimen of the ammonio-citrate of iron, from the President; the outer rind (in the form of large ornamental bowls) of the fruit of a species of gourd from the coast of Africa, from Mr. Blundell.

Mr. Arnott exhibited a specimen of paraffine oil, made from the coal of New Brunswick. The President exhibited a beautifully perfect wasp's nest, which was covered with a fine, soft, paper-like substance, made by the wasps themselves, apparently composed of vegetable hairs, down, and fibre.

Dr. EDWARDS then delivered the lecture of the evening on

THE NATURAL GROUPS OF ELEMENTARY SUBSTANCES.

He first gave a sketch of the theoretical and experimental history of the present system of atomic weights, from the time of Lavoisier and Berzelius to the determinations made quite recently by M. Dumas; and to the fruitless efforts which had been made to show a simple numerical relation between many of the elements, and the atom of hydrogen as a unit. The views of Dr. Prout, and the atomic theory of Dalton, were discussed, and the difficulties and contradictions involved in the division of all elementary bodies into two great classes pointed out. The favourite division of Berzelius into "Metallic and Non-metallic elements," and the later views of Davy of electro-negative and electro-positive elements, were shown to be equally unsuited to the proper classification of certain elements, such as nitrogen, hydrogen, selenium, arsenic, and antimony. The usual groupings of the metals in relation to their volatility or oxidation, at certain temperatures, was also shown to bring together, in many cases, elements whose properties in other respects were very heterogeneous. Attention was then drawn to the labours of M. Dumas, in Paris, with a view of associating together elements, which possess marked properties in common, some account of which has already appeared in the *Pharmaceutical Journal* (vol. xviii., p.

36, *et seq.*), and to the elaborate and curious tables of Mr. Josiah Cooke, of Harvard University, in America, who shows that an extraordinary numerical relation exists between the atomic weights of certain elements, which have also many properties in common, and form remarkable groups, allied both naturally and numerically. Thus arranged, the elements form six natural groups, having each a common term of progression for the atomic weight of the next element, this term being 3, 4, 5, 6, 8, and 9 respectively in the several groups. The first element in each group is representative, and enjoys in the highest degree the properties characteristic of the group, these properties become less marked in each succeeding member of the group, and in degree as the atomic weight of the element increases, indeed in the lower members of some of the groups, the analogies become comparatively feeble. M. Dumas, therefore, prefers to arrange them in more numerous groups, having in each elements possessing more striking common properties; these form, for the most part triads, in which the middle element possesses the mean atomic weight, and also the mean properties of those which precede and follow it.

Thus in the groups of alkaline oxides we have—

Lithium.....Eq. 7		
Sodium .....Eq. 23	———	The mean of 7 and 39 is 23, and sodium possesses a mean share of the properties possessed by lithium and potassium.
Potassium.....Eq. 39		
Common term of progression ..... =16		

Calcium .....Eq. 20		
Strontium ...Eq. 44	———	The mean of 20 and 68 is 44, and strontium possesses mean properties between Ca and Ba.
Barium.....Eq. 68		
Common term of progression..... =24		

Again, among the other class of elements are:—

Chlorine.....Eq. 35.5		
Bromine.....Eq. 81	———	The mean of 35.5 and 126.5 is 81, and bromine stands intermediately related to Cl. and I.
Iodine.....Eq. 126.5		
Common term of progression ..... = 45.5		

Note.—The above are mere examples of the tables by which the views of the various authors referred to were illustrated.

Dr. Odling, in the *Philosophical Magazine*, has made another generalization, intermediate between those of M. Dumas and Mr. Cooke, but inasmuch as he adopts other equivalents, for many important elements, than those generally recognized by Chemists, he alters both the nomenclature and the general views of the relations of some of these elements, and only proves how difficult it is in the present state of our knowledge for Chemists to agree upon such data as would establish a change in the relations of these elements, resembling that which Jussieu and De Candolle accomplished in the science of botany. The immediate point of interest is the coincidence of atomic weight, atomic volume, common properties, and numerical relations obtained in these groups. The ultimate prospect is the establishment of such relations as will lead to the discovery of the true elementary nature of matter, the unity of which has long been a favourite idea among philosophers.

Dr. Collingwood said that he would refer to some considerations which had passed through his mind during the delivery of the interesting and suggestive lecture which they had just heard. It was the tendency of modern science to elaborate the numerical relations which appeared to exist in the atomic constitution of bodies, and of this the tables of the American chemist formed a remarkable example; and although they were somewhat hypothetical and transcendental, he was not inclined to consider them upon that ground as unworthy serious attention. It would be remembered that glimpses of the doctrine of definite proportions were of great antiquity, and preceeded by many a century the elaboration of the Daltonian theory. The existence of atoms was fully believed by the Epicureans, and Pythagoras and his disciples appear to have had some notion that matter was governed by a law of definite proportion. Notwithstanding that the ideas of the latter philosopher concerning the powers of number were somewhat marvellous (for he considered them little less than magical), the assertions of some of his disciples that number existed before all things in the Divine Mind, and that it was the rule of creation, appear to

contain germs of the great truth. A very remarkable and often-quoted line from the Book of Wisdom expresses the current idea of the ancient philosophers on this point in a manner which admits of no dispute, where it is said

Πάντα μέτρῳ, καὶ ἀριθμῷ, και σταθμῷ διέταξας.

that is, that the Divine Power arranged all things by measure, by number, and by weight.

Whether these remarkable ideas originated with Pythagoras, or might be traced to an even earlier period, is doubtful, but he certainly visited Egypt, and derived much of his lore from that ancient and extraordinary people; but in any case it could not have been arrived at inductively as the result of experiment, unless we suppose with Bailly that these bold ideas were the shattered remnants of a higher antiquity, and of a science already brought to perfection. But the fact that many of the most common and necessary appliances by which science is advanced have only been known within a comparatively recent period, renders this highly improbable. The true source of these bold and merely philosophical speculations must be looked for in the genius of the people from whose inventive minds they sprung. This has been well illustrated by Daubeny, who sees in the discovery of the metamorphosis of plants by the German poet Goethe a parallel instance. Goethe was no botanist beyond what poets usually are, yet from his closet he threw out a great generalization, which the extensive knowledge of De Candolle was enabled to elaborate and establish. So the poetic mind of the sages of antiquity appears to have been impressed with a powerful sense of the Harmony of the Universe, whose rolling spheres produced celestial music, and whose very microcosms were built up on a plan at once definite, symmetrical, and perfect.

A vote of thanks to the lecturer was carried, after which the meeting broke up.

ORIGINAL AND EXTRACTED ARTICLES.

STUDY.

(Third Notice and last.)

BY MR. JOSEPH INCE.

I HAVE ventured for the last two years to offer a few practical remarks with regard to study, and now attempt once more, like Paganini, to perform a variation on a single string; and partly somewhat to avoid monotony, partly to keep pace with the marvellous progress of the age, I have thought that it would not be altogether inappropriate at the close of another year, to give a short but sufficient notice of those aids to evening study which exist in London.

Hitherto I have purposely confined myself to the subject of self-education, recollecting that I was addressing those who had limited time and narrow advantages. I confess to having faith in private study, and I think that a clear head and a good book are very satisfactory companions. Great men come from solitude; *aide toi et Dieu t'aidera*, says the proverb; but many (and especially Assistants) hold a different creed. Either from personal disinclination, or from a want of previous discipline, they hate the lonely room and silent manual, and one week's solitary application has a fatal tendency to inspire them with a profound and absolute disgust for learning and its very name. To these, and others whom it may concern, I beg to advance the following remarks, trusting that they will make due allowance if occasionally I have soared too high or sunk too low; for I have gathered information from heterogeneous sources; and sincerely thanking those who so courteously have promoted the design, I shall, without further prelude, conduct the student to our

EVENING CLASSES.

I.—CITY OF LONDON CLASSES.—*Director, Dr. Bucheim.*
10, Tokenhouse Chambers, Tokenhouse Yard, Lothbury, E.C.

German, Dr. Bucheim.....	Monday	6	o'clock	to	7	Beginners
	Thursday	7	"	"	8	Advanced
	"	8	"	"	9	Intermediate

French, Mons. J. Roche	Monday	7 o'clock	to	8	Beginners
	Thursday	8 "	"	9	Advanced
	Wednesday	4 "	"	5	Intermediate
	Saturday	5 "	"	6	Beginners
Commercial Arithmetic, Mr. Hardy	Wednesday	6.30 "	"	8.30	
	Saturday	2 "	"	4	

Terms per quarter (twelve weeks), for French and German, two lessons weekly, £1 1*s.*; Commercial Arithmetic, £2 2*s.* Each class is limited to twelve pupils.

II.—Crosby Hall.
32, Bishopsgate St. Within, E.C.
(In union with the Society of Arts.)

Hours from 7 o'clock to 10 o'clock. Instruction given in French, German, Greek, Latin, Arithmetic, Short-hand, and general subjects. The reading-room is open from 9 A.M. to 10.30 P.M. Terms : for reading-room, library, lectures, and *one class* (with some exceptions), £1 1*s.* per year; 6*s.* per quarter. For reading room, library, and lectures, 4*s.* per quarter. Non-members are admitted to each lecture on payment of 6*d.*, or 2*s.* 6*d.* per term. A chemistry class will be formed as soon as twenty names are given in.

III.—French Classes.—*M. de Beauvoisin.*
17, King William Street, City, E.C.

Monday.	Tuesday.	Wednesday.	Thursday.
6 to 7.30	7 to 8.30	6 to 7.30	6 to 7.30
7.30 to 9			7.30 to 9

Terms: first quarter, 25*s.*; second, 21*s.*; third, 18*s.*; fourth, 16*s.* Complete course, twelve months, £3 3*s.* These lessons are popularly known as the Oral and Practical Method.

IV.—French Classes.—*Mons. A. Roques.*
22, Brownlow St., High Holborn, W.C.

Lessons of one hour each, every evening, from 5 to 10 o'clock. Terms: 12*s.* per quarter (two lessons a week). Private lessons, £2 2*s.* per quarter. German also taught.

V.—Hamiltonian Institution.—*Director, L. J. Rosenthal.*
355, Oxford Street, W.

French, German, or Italian, three months, two lessons a week, £2 2*s.* Twenty-six lessons taken at any time constitute a quarter. Lessons may be had from 8 in the morning till 11 at night.

Elementary and Conversational Classes are likewise held, and instruction is given in Writing and Book-keeping.

VI.—Hullah's Classes for Singing.
St. Martin's Hall, Long Acre, W.C.

Every Monday and Thursday, from 6.30 to 7.30, and every Monday and Thursday, from 8.30 to 9.30. Terms for the course of fifty lessons, 15*s.* For other information apply to Mr. Thomas Headland, Secretary.

There are branch singing schools of various grades in most of the London populous parishes.

In the present summary I have thought it right to include a notice of evening classes of the highest, as well as of the most elementary character, so that a student may select those best suited to his own means and capacity ; my object being that no Assistant shall remain unacquainted with the advantages which are at his door. I therefore offer no apology for introducing the rising Pharmaceutist to the new and excellent system of the

VII.—King's College, London, Evening Classes.

The following is the time table:—

	Monday.	*Tuesday.*	*Wednesday.*	*Thursday.*	*Friday.*
7 to 8	Latin. Economical Science. German (jun)	Mathematics. English. Drawing.	Divinity.	Latin. Chemistry. Commercial Contracts. German (jun)	Mathematics. English. Drawing.
8 to 9	Greek. German (sen) Arithmetic.	French. History.		Greek. German (sen) Arithmetic.	French. Geography.

Fees: for any single course, except Divinity, £1 11*s.* 6*d.*; for Divinity only, 10*s.* 6*d.*, this class being free to all students attending any other class. For any four classes, £5 5*s.* A reduction in fees after Christmas prizes: and certificates of merit are awarded. These courses have been established in order that persons in business, assistants, and others engaged in day occupations, need not be shut out from the acquirement of a sound classical and university education. The attempt has been remarkably successful, and its practical results have been well explained in the *Times* of Nov. 13, 1858.

VIII.—Ollendorff Institution.—*Director, H. de la Fontaine.*
268, High Holborn, W.C.

Lessons twice a week, one hour each, in French, German, and Italian, per quarter £2 2*s.* Lessons in Spanish, Portuguese, Latin, and Greek, per quarter £3 3*s.* The whole of the instruction is, of course, based on the Ollendorff system.

IX.—Royal Polytechnic Institution.
(Evening Classes.)

Monday	Grammar, 7 to 8	Arithmetic, 8 to 9
Tuesday	Chemistry "	German "
Wednesday	French "	Do., advanced "
Thursday	Algebra "	
Friday	Drawing, 7 to 9	

Fee for one course, 5*s.*; for two subjects, 8*s.* Tickets to be obtained of Mr. Cousens, at the Institution.

A ticket giving free admission to the South Kensington Museum on students' days can be had on application.

In addition to these regular lectures, a minor but still very useful aid to practical study may be found in our public reading-rooms. One by one they spring up around us, and help to occupy many a vacant hour. To these establishments (and they are so well known as scarcely to need description) French, Germans, and Italians resort assiduously. Reserved and unfortunate indeed must be the learner, who is there not able to improve his foreign capabilities to his heart's content. Three of these street libraries deserve a mention:—

I.—Wylde's Reading Rooms.
Leicester Square, W.C.
Admission One Penny.

Open from 7 A.M. to 11 P.M. during the week, and from 7 A.M. to 10 P.M. on Sundays. The arrangements are in every respect excellent. The rooms are supplied with the daily and weekly papers, both London and provincial, magazines, periodicals, and the French and German papers. Refreshments supplied at moderate terms, and for those who are interested in public matters there is a discussion-room up-stairs. Letters may be addressed here on payment of one halfpenny.

II.—West End News Room.
76, Strand, W.C.
Admission One Penny.

Open from 9 A.M. to 10 P.M.; supplied with the newspapers and weekly (not monthly) periodicals. Coffee always ready. Letters may be addressed here.

III.—The City News Rooms.
66, Cheapside, E.C.
Entrance One Penny.

Furnished with newspapers, magazines, and periodicals.

I should be deeply sorry to convey an impression that the Sunday may be applied to any but devotional purposes, but as it invariably happens that those engaged in studying a foreign language are anxious to live for the time in its very atmosphere, this perhaps is the best place to mention that there are three French churches, in all of which the seats are free :—

L'Eglise Française, St. Martin's-le-Grand, E.C.
Pasteur the Rev. Th. Marzials, B.D.

L'Eglise Suisse, Bloomsbury Street, W.C.
Mons. le Pasteur Choisy.

L'Eglise Anglicaine, Endell Street, W.C.
Mons. le Pasteur Mudry.

In this last our English liturgy is translated into French.

The German Lutheran Chapel is in the Savoy, Strand.
Pastor, the Rev. Dr. Steinkopff.

The price of a French Testament is 6*d.*, of a French Bible 1*s.* 4*d.*; of a German Testament 8*d.*, of a German Bible 1*s.* 6*d.*

(*To be continued.*)

REPORT OF THE

RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION,

AND OF THE

APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

BY B. H. PAUL, Ph.D.

(*Continued from p.* 273.)

Chemical History of Murexide.—This substance was regarded by Liebig and Wöhler* as having more analogy to the amides than to the ammoniacal salts. They gave the preference to the formula $C_{12}\ H_6\ N_5\ O_8$, but were of opinion that it might be a compound of several amides. Soon afterwards, Dr. Prout's view of its constitution was supported by Hr. Fritzsche,† who prepared several salts of purpuric acid by double decomposition, and who assigned to purpurate of ammonia the formula $C_{16}\ N_6\ H_8\ O_{11}$. There were, however, some discrepancies in the results obtained by Hr. Fritzsche, and it was argued by Prof. Liebig,‡ that the production of murexide from uramil—a substance that does not contain ammonia—by reaction with oxide of silver, was inconsistent with the opinion that it was of a saline nature. He pointed out, moreover, that murexide is decomposed by sulphuretted hydrogen, without any sulphide af ammonium being produced.

This difference of opinion induced Prof. Gmelin to attempt a representation of the constitution of murexide and the allied substances by means of the nucleus theory. The formula he adopted required that alloxantine should be wholly converted into murexide, by combination with ammonia ; and this was found to be the case when ammonia was passed over alloxantine heated in a warm bath. Guided by this fact, he assigned to these substances the following formulæ :—

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* *Annalen der Chemie und Pharmacie*, xxvi., 241.
† *Bulletin de l'Acad. de St. Petersbourg*, v., 161.
‡ *Annalen der Chemie und Pharmacie*, xxxiii., 320.

Alloxantine ..... $C_{16} N_4 H_4 O_{14} + 6 HO$
Purpuric acid ..... $C_{16} N_5 H_5 O_{12}$
Murexide ..... $C_{16} N_6 H_8 O_{12}$
Murexan ..... $C_{16} N_5 H_7 O_{12}$

This view was adopted by Gerhardt and others, but there was still doubt as to the constitution of murexide, and for this reason Hr. Beilstein has recently investigated this subject afresh. He prepared murexide from uramil by treating it with oxide of mercury. By the aid of the microscope it appeared perfectly homogenous, and without any red flocculent substance. By analysis it gave—

		Calculated.	Fritzsche.	Liebig & Wöhler.
Carbon	34.18	33.80	—	34.08
Nitrogen	30.35	29.58	30.79	32.90
Hydrogen	3.11	2.82	2.83	3.00
Oxygen	32.36	33.80	31.47	30.02

The composition of the other purpurates, as well as the decomposition and production of murexide, show that it contains twelve atoms of oxygen, for

Alloxantine. Murexide.
$$C_{16} N_4 H_4 O_{14} + 2 NH_3 = C_{16} N_6 H_8 O_{12} + 12 HO.$$

The estimation of the nitrogen by Hr. Beilstein§ was made with soda lime, which is a safer method than that adopted by Liebig and Wöhler.

The amount of water of crystallization in murexide was found to be equal to two equivalents, as shown by Kodweiss.

With regard to the constitution of murexide, it was considered that if it were an amide it ought to yield an ammonia salt when heated with water. Wöhler was not able to arrive at any decisive result from this experiment. On the other hand, the fact that murexide gives off ammonia when covered with caustic potash, even at the ordinary temperature, is opposed to the view that it is an amide, because this reaction is characteristic of ammonia salts, and does not take place with amides till heat is applied.

The production of murexide from uramil and oxide of mercury may be represented by the equation

$$2 C_8 N_3 H_5 O_6 + 2O = C_{16} N_6 H_8 O_{12} + 2 HO$$

Liebig and Wöhler found that the liquid from which murexide had been separated, gave the reactions of alloxan, and believing that this acid substance had some influence on the murexide produced, they added from time to time some ammonia, which actually increased the yield of murexide. This result was probably due to the solution of the uramil by the ammonia, so as to render its admixture with the oxide of mercury more intimate.

Hr. Beilstein considers that murexide is an acid salt, and not, as has hitherto been supposed, a neutral salt. Taking this view of its constitution, the apparent discrepancies between it and the ammonia salts are removed, for there would be an equivalent of basic water in murexide which could not be separated by heat without decomposition. This water has been separated from the potash salt at a temperature of 300° C. It was pointed out by Dr. Prout that the salts analyzed by him appeared to contain two equivalents of acid for one of base. This view agrees also with the fact, that in preparing murexide an excess of ammonia must be avoided, inasmuch as it decomposes the murexide that has been produced.

The decomposition of murexide by acids is represented by Liebig and Wöhler thus :—

Murexide. Alloxan. Alloxantine. Murexan. Urea.
$$2 C_{12} N_5 H_6 O_8 + 11 HO = C_8 N_2 H_4 O_{10} + C_8 N_2 H_5 O_{10} + C_6 N_2 H_4 O_5 + C_2 N_2 H_4 O_2 + 2 NH_3$$

They obtained 30 and 46 per cent. murexan from this decomposition, though, according to the equation, the product should not have been more than 25.5 per cent. Hence Gmelin assigned to murexan the formula $C_{16} N_5 H_7 O_{12}$, and represented the decomposition by the equation—

Murexide. Murexan. Alloxan.
$$2 C_{16} N_6 H_8 O_{12} + 4 HO = C_{16} N_5 H_7 O_{12} + 2 C_8 N_2 H_2 O_8 + 3 NH_3$$

according to which the yield of murexan would be 47.4 per cent. Hr. Beilstein regards murexan and uramil as being identical, and represents the change by the equation—

$$C_{16} N_6 H_8 O_{12} + 2 HO = C_8 N_2 H_2 O_8 + C_8 N_3 H_5 O_6 + NH_3,$$

that is to say, purpuric acid is decomposed at the moment of elimination into uramil and alloxan, the yield of the former substance being 47 per cent. The alloxantine

and urea are probably merely products of further decomposition, since their amount is sometimes very small.

Liebig refers to the decomposition of murexide by sulphuretted hydrogen as opposed to the opinion that it is of a saline nature. But the absence of sulphide of ammonium as a product of this reaction is most likely due to the further reaction between it and the alloxan and the production of dialurate of ammonia.*

Arbutin and its Transformations.—The leaves of the *arctostaphylos uva ursi* contain a crystallizable bitter substance, discovered by Kawalier in 1852, and called arbutin. Its composition was represented by the formula $C_{32}\ H_{22}\ O_{19} + 2\ HO$. It was considered that arbutin was decomposed by emulsin into grape sugar and another crystalline substance called arctuvin, to which the formula $C_{20}\ H_{10}\ O_7$ was assigned.

Prof. Strecker† has since examined this substance, and found its characters and composition the same as stated by Kawalier. He adopts, however, the formula $C_{24}\ H_{16}\ O_{14} + HO$ for the crystallized substance.

When arbutin was boiled with dilute sulphuric acid, there was no perceptible alteration of the liquid, but it had acquired the power of reducing an alkaline solution of oxide of copper. When this solution, after being boiled for some time, was shaken with ether, and the ether extract evaporated, there remained colourless crystals that were readily soluble in water, alcohol, and ether. This substance agreed with that described by Kawalier as arctuvin, but the further examination showed that it was hydrochinon, corresponding in every respect with that prepared by Wöhler from chinic acid, or chinon.

This breaking up of arbutin into hydrochinon and sugar may be represented by the equation—

$$\underset{\text{Arbutin.}}{C_{24}\ H_{16}\ O_{14}} + 2\ HO = \underset{\text{Hydrochinon.}}{C_{12}\ H_6\ O_4} + \underset{\text{Grape Sugar.}}{C_{12}\ H_{12}\ O_{12}}$$

Consequently arbutin corresponds with salicin, which is separated under like conditions into saligenin and sugar—

$$C_{26}\ H_{18}\ O_{14} + 2\ HO = C_{14}\ H_8\ O_4 + C_{12}\ H_{12}\ O_{12}$$

These substances differ by $C_2\ H_2$, and there is the same difference between hydrochinon and saligenin. There is also a great resemblance between the characters of these substances, though it may still be questionable whether they bear the same relation to each other as acetic and propionic acid.

Taking hydrochinon and saligenin as the starting-points of series of compounds, those below named would correspond:—

Arbutin.....$C_{24}\ H_{16}\ O_{14}$	Salicin.....$C_{26}\ H_{18}\ O_{14}$
Hydrochinon .....$C_{12}\ H_6\ O_4$	Saligenin .....$C_{14}\ H_8\ O_4$
Chlorhydrochinon .....$C_{12}\ H_5\ Cl\ O_4$	Chlorsaligenin .....$C_{14}\ H_7\ Cl\ O_4$
Bichlorhydrochinon .....$C_{12}\ H_4\ Cl_2\ O_4$	Bichlorsaligenin .....$C_{14}\ H_6\ Cl_2\ O_4$
Trichlorhydrochinon .....$C_{12}\ H_3\ Cl_3\ O_4$	Trichlorsaligenin .....$C_{14}\ H_5\ Cl_3\ O_4$
Chinon.....$C_{12}\ H_4\ O_4$	Salicylic acid.....$C_{14}\ H_6\ O_4$
Chlorchinon .....$C_{12}\ H_3\ Cl\ O_4$	Chlorsalicylic acid.....$C_{14}\ H_5\ Cl\ O_4$

There are many substances belonging to the saligenin series that are wanting in the hydrochinon series, and some of the latter also that have no analoges in the saligenin series.

Unknown .....$C_{12}\ H_4\ O_6$	Salicylic acid.....$C_{14}\ H_6\ O_6$
Unknown .....$C_{12}\ H_4\ O_2$	Saliretin .....$C_{14}\ H_6\ O_2$
Green hydrochinon .....$C_{24}\ H_{10}\ O_8$	Unknown .....$C_{28}\ H_{14}\ O_8$
Bichlorchinovic acid.....$C_{12}\ H_2\ Cl_2\ O_8$	Unknown .....$C_{14}\ H_4\ Cl_2\ O_8$

There is much uncertainty as to the homologous relation of these series, for though hydrochinon is converted into chinon by the same means that saligenin is converted into salicylic acid, the chemical characters of these substances are very different.

Prof. Strecker regards it as probable that the constitution of hydrochinon, chinon, and chinovic acid may be represented as follows:—

$$\text{Hydrochinon.....}\ \left.\begin{matrix} C_{12}\ H_4\ O_2 \\ H \\ H \end{matrix}\right\} O_2 \quad \text{or} \quad \left\{\begin{matrix} C_{12}\ H_4\ O_2 \end{matrix}\right. \left.\begin{matrix} H \\ H \end{matrix}\right\} O_2$$

* *Annalen der Chemie und Pharmacie*, cvii., 176. † *Ibid.*, cvii., 228.

Chinon..... $C_{12} H_4 O_2 \}$ O_2

Chinovic acid..... $C_{12} H_2 O_4 \}$ O_4
$H_2 \}$

The radical $C_{12} H_4 O_2$ would be a diatomic alcohol radical, which, by substitution of oxygen for hydrogen, is converted into the diatomic acid radical $C_{12} H_2 O_4$. Styphnic acid $C_{12} H_3 [NO_4]_3 O_4$ is perhaps the nitro compound which bears the same relation to hydrochinon as picric acid does to phenyl alcohol.

Weighing Precipitates in Analysis.—M. Mène* recommends collecting the precipitate after it has been well washed by decantation, in a specific gravity bottle, and determining the difference in the weight of the bottle filled with water, when containing the precipitate and without it. This difference, of course, represents the weight of the precipitate. Other liquids than water may be used in the same manner when the precipitates are soluble in water.

Conversion of Acetic Acid into Methyl Alcohol.—The substances belonging to the group of acetones have recently been regarded as containing two different atomic groups, ordinary acetone for instance, being $\{ \begin{matrix} C_4 H_3 O_2 \\ C_2 H_3 \end{matrix}$ and Hr. Friedel† has succeeded in producing methyl alcohol from acetone, which he considers to be a proof of the correctness of this view.

Under ordinary circumstances hydrochloric acid does not affect acetone, though it is dissolved in large amount. But when this solution is heated for eight or ten hours in a sealed tube by means of a water-bath, it separates into two layers. On opening the tube a gas is disengaged, consisting of chloride of methyl, and the liquid contains acetic acid, together with some unaltered acetone. This decomposition of acetone may be represented by the following equation:—

$$2\ C_6 H_6 O_2 + HCl = C_4 H_4 O_4 + 4\ C_2 H_3 Cl.$$

Hydriodic acid acts upon acetone even at the ordinary temperature, and when the liquid is saturated it may be distilled. At first iodide of methyl passes over and acetic acid remains behind. By heating this iodide of methyl with oxalate of silver in a sealed tube, it is converted into oxalate of methyl, which, by reaction with potash, yields methyl alcohol.

Iodide of phosphorus acts upon acetone in the same manner as hydriodic acid.

Action of Water Vapour and Carbonic Oxide upon some Sulphates.—When a current of water vapour and carbonic oxide is passed over sulphate of potash, soda, magnesia, strontia, or baryta, at a red heat, carbonic acid is evolved, together with sulphuretted hydrogen, and finally there remains only the pure oxides.‡ The water vapour carries with it very finely-divided sulphur, originating from the partial decomposition of sulphuretted hydrogen.

The reaction may be represented by two equations, viz.:—

$$M O, SO_3 + 4\ CO = M S + 4\ CO_2$$

and—

$$M S + 2\ HO = MO, HO + HS.$$

M. Jacquemin has obtained sulphides of sodium and magnesium in this way. By the subsequent reaction of the water vapour with the sulphides, they are converted into sulphuretted hydrogen and oxides.

It is probable that these reactions may admit of some industrial application. In this case it would not be necessary to prepare carbonic oxide specially, because the gases proceeding from furnaces would contain sufficient of this gas. Thus, for instance, if caustic baryta were to be largely employed, it could be prepared by this method at a cheap rate. There would also be the further advantage that the sulphur could be utilized and converted into sulphuric acid.

In the preparation of carbonate of soda on the large scale, the whole of the sulphur passes into the state of oxysulphide of calcium, which is not only a useless but an inconvenient product. By the above described method the whole of the sulphur might be recovered and converted into sulphuric acid, to be used again in making sulphate of soda.

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* *Comptes Rendus*, June, 1858.
† *Ibid.*, xlvi., 1165. ‡ *Ibid.*, June, 1858.

Preparation of Pure Oxide of Uranium.— The oxide of uranium obtained from the uranium ore of Joachimsthal, is generally contaminated with arsenic acid to the extent of from five to seven per cent. It was desirable to separate this arsenic by some simple method, and also to devise some plan of obviating the contamination of the uranium-yellow with arsenic.

The arsenic acid existed in combination with the oxide of uranium as arsenate—a pale yellow salt, which is difficult to decompose, dissolves in acids, and also in an excess of carbonate of soda, and therefore behaves nearly like pure yellow oxide of uranium, except that the arsenate of uranium is rather less soluble in both solvents.

There would be great difficulty in removing the arsenic acid as sulphuret of arsenic by sulphuretted hydrogen gas, because the arsenate is difficult to decompose in this way; the yellow peroxide of uranium would also be converted into green protoxide, which must be again oxidized.

Hr. Patera* first attemped to combine the arsenic acid with peroxide of iron, by dissolving the impure uranium-yellow in sulphuric acid, adding a solution of perchloride of iron to the acid solution, then precipitating the uranium with solution of carbonate of soda, and dissolving it in an excess of this reagent. When the solution was boiled, the arsenate of iron separated completely with the excess of peroxide of iron added.

On the small scale there was no objection to this method, but on the large scale the quantity of the ferruginous precipitate was troublesome. Although the yellow oxide of uranium obtained in the ordinary way from the solution was very pure, and had a beautiful colour, this method, which in many cases may be very serviceable, was abandoned and another adopted, by which corresponding results were soon obtained. The uranium-yellow was dissolved in sulphuric acid, but care was taken only to add so much that the entire mass was not dissolved. The arsenate of uranium, as already stated, not being so readily soluble as the oxide of uranium, the greater part of that salt remained undissolved. For the same reason, by careful supersaturation with carbonate of soda, the greater part of the arsenate of uranium dissolved in the sulphuric acid could be separated again, whilst the pure oxide of uranium readily dissolved with the soda. These two products, in which nearly all the arsenic in the uranium-yellow to be purified was concentrated, were mixed and operated upon together.

The quantitative analysis made of them by E. Wysoky gave 59.35 of oxide of uranium, 27.98 of arsenic acid, and 12.50 of water; this composition corresponds pretty well with the formula $(Ur_2\ O_3)_2$, $AsO_5 + 6Aq$.

To get rid of the arsenic acid from this product by a working process, it was finely powdered, calcined for several hours, first with charcoal dust, and afterwards with 15 per cent. of dry carbonate of soda, with which a little nitrate of potash was mixed, and then washed with hot water. The water dissolved the arsenate of soda, and with it also soda-salts of metallic acids, especially vanadate of soda. The yellow oxide of uranium obtained from the residue was perfectly free from arsenic. An experiment was then made with a hundred-weight of rich uranium ore, by calcining with carbonate of soda instead of with lime, then washing with hot water and dissolving the residue in acid. The arsenic of the ore could be completely got rid of in this way, and the ore dissolved in acid could be very quickly worked, since no sulphate of lime was present to retard the washing. The residue contained mere traces of uranium. The use of carbonate of soda instead of lime in the calcining would certainly cause a slight increase of expense; but this need hardly be taken into consideration, as labour is saved by the easier washing; a pure product is obtained, and vanadic acid, which is still so rare, is procured without any further considerable expense.

In conclusion, attention is drawn to the utility of this method of separating the last portions of arsenic from an arsenical speise, as it will be of especial use to the manufacturers of nickel. It is certainly easy, by calcining with charcoal, to volatilize the greater part of the arsenic; but a considerable portion of it remains obstinately with the nickel, and is difficult of separation therefrom even in the humid way. This contamination, which is exceedingly injurious to the quality and applicability of nickel, is completely got rid of by the process above described, which presents no technical difficulties, and is both accurate and inexpensive.

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* *Oesterreich. Zeitschrift für Berg-und Hüttenwesen*, 1856, No. 31.

To obtain the vanadium, the uranium ore is first calcined dead, in order to get rid of the sulphur, arsenic, and molybdenum contained in it as completely as possible; it is then calcined for an hour with 15 per cent. of carbonate of soda and 2 per cent. of nitrate of potash. In this way acid uranate of soda is formed, and then arsenate, vanadate, molybdate, and some silicate of soda. If the calcined mass be now lixiviated with hot water, the uranate remains undissolved ; whilst the soda-salts of arsenic, vanadic, molybdic, and silicic acids, as well as the undecomposed carbonate of soda, are dissolved. The residue containing the uranium is used for the preparation of uranium-yellow, and the liquid is operated upon for vanadium. It would not be advisable to hand over this liquid to the chemical laboratories for the preparation of vanadium, because the amount of vanadium in the ore is very small, hardly exceeding that of the vanadiferous iron ores of Sweden and the Harz, which Bodenmann describes as containing 0.2 per cent. of vanadic acid. If we suppose this amount to be completely separable from the ores of Joachimsthal, we should get by evaporation from 1 cwt. of uranium ore a saline mass of about 20 lb, which would contain about 3 oz., that is to say, 1 per cent. of vanadic acid. Few laboratories are adapted for operating upon such large masses of salts ; it therefore appeared desirable to concentrate the vanadium quickly, and without loss or great expense, into a smaller saline mass.

By the precipitation of vanadic acid with muriate of ammonia, a pure product is certainly obtained, but a large quantity of the acid remains in solution, and this can hardly be procured, as the quantity of salt is increased by the muriate of ammonia. Vanadium might also be obtained in the form of sulphuret, by supersaturating the solution of the vanadate with an alkaline sulphuret, when sulphuret of vanadium is dissolved, and can be again thrown down as brown sulphuret of vanadium by supersaturating the solution with a dilute acid. In this case also a great deal of vanadium remains in solution in the form of vanadous acid, by which the solution appears of a more or less blue colour ; but this operation would also be very inconvenient on a large scale, and even dangerous, on account of the great evolution of sulphuretted hydrogen gas.

Pyrites are often intermixed with the ores of uranium ; in roasting, sulphates are then formed, and these pass over into the lye. A precipitation of the vanadic acid by a baryta-salt would therefore be very dear and furnish a very impure product; moreover, this precipitation is far from being complete. Precipitation with mercurial salts also is not applicable on a large scale.

Hr. Patera therefore made use of the well-known reaction of tincture of galls, which furnishes a deep blue solution with vanadates, but only succeeds when the solution is perfectly neutral. It is, however, inapplicable to the preparation of vanadium, because no precipitate is produced. But if a solution containing vanadium be acidified with an acid, such as muriatic acid, then mixed with decoction of galls and carefully neutralized with soda, a dark blue voluminous precipitate of tannate of vanadium is thrown down, which settles quickly and may be easily filtered. With it tannate of soda, and some compounds of molybdenum, arsenic, uranium, and silica, are also thrown down. The deep indigo-blue precipitate contracts greatly in drying and becomes black; if it be calcined, the tannic acid is burnt away, some arsenic and molybdenum are evolved, and there remains an impure vanadate of soda, probably mixed with vanadite; this crude product may then be employed in the preparation of pure vanadium compounds.

From a hundred-weight of uranium ore 9 oz. of the tannate were obtained on an average ; after calcination, these gave 5 oz. of the above crude product.

The expense of its preparation was not much higher than that of the simple evaporation of the lye ; the expense of the first calcining with carbonate of soda and nitrate of potash, and the washing with hot water, are connected with the manufacture of uranium-yellow; the labour specially relating to the vanadium is therefore very small, and may easily be performed by the same workmen who are engaged in the manipulation of the uranium. In the preparation of the tannic acid compound from the saline solution from 1 cwt. of ore, there were employed—

2lb of muriatic acid	4*d.*
1lb of gall-nuts.....	12*d.*
4lb of carbonate of soda	9½*d.*
	2*s.* 1½*d.*

The apparatus necessary is limited to a few wooden tubs and linen filtering bags. The advantages of the method described are simplicity and cheapness, combined with great exactness. The crude product, obtained at a cost of about 2s. 1½d., contains about 30 per cent. of vanadic acid; the pound of vanadic acid in the crude product cannot, therefore, cost much more than 20s.; and the work at the same time is so simple that it can be performed with ease by any skilful operative, while the vanadium contained in the liquid is so completely collected in the crude product that not a trace can be detected in the fluid filtered from the blue precipitate when the point of neutralization has been reached. The reaction is so delicate, that the small quantities of vanadium which remain with uranium in the solution of sulphate of soda left as a mother-liquor in the manufacture of uranium-yellow may be obtained from it. The loss by waste is very small, as the precipitate of tannate of vanadium is exceedingly voluminous in the moist state, and contains comparatively very little vanadium. According to an approximate valuation, the uranium ore of Joachimsthal contains 0.2 per cent. of vanadic acid; and as 30 to 50 cwt. of this ore are worked annually, the quantity of vanadic acid obtained would amount to about 10lb. in the year, which is certainly a large quantity, considering the rarity of the substance.

ALCOHOLIC COLLODION.

Absolute ether.....3½ drachms.
Absolute alcohol .....2½ drachms.
Pyroxiline*.....6 grains.

IODIZING SOLUTION.

Iodide of potassium.....12 grains.
Distilled water..... 6 drops.
Iodide of cadmium ..... 5 grains.
Absolute alcohol ..... 1 ounce.

2 drachms of iodizing solution to 6 drachms of collodion.

SULPHATE OF MANGANESE OINTMENT.

Dr. Hoppe, a French physician, recommends this ointment as a substitute for iodine ointment. The usual proportion is one drachm of sulphate of manganese to one ounce of simple cerate; if it be desirable to produce pustules, the quantity of sulphate is increased to one and a half drachms to the ounce. A small quantity of extract of belladonna is sometimes added. To avoid grittiness, the sulphate should be dissolved in a very small quantity of water before mixing it with the cerate.

PRESERVATION OF ANIMAL AND VEGETABLE SUBSTANCES.

A patent has lately been taken out for effecting this object. The improvements consist in coating animal and vegetable substances with a compound formed of vegetable albumen and a suitable antiseptic material. The coating is effected by immersing the substances to be preserved in the prepared compound two or three times, each coating being dried or set in a current of air before the next is applied. The object of combining an antiseptic agent with the vegetable albumen is to prevent a partial decomposition of the substances occurring before the protective coating is properly hardened. The following means may be adopted for carrying the invention into effect:—Supposing a joint of meat to be the substance to be preserved, the meat (with as much of its blood extracted as possible) is first washed or immersed in water impregnated with acetate of alumina and allowed to drain, it is then suspended by a string, and allowed to descend into a bath composed by placing about one pound of gum adraganthe (or gum dragon) in from one and a half to two gallons of heated water for about twenty-four hours, straining the solution, then mixing with it a warm solution of about six ounces of gelatine or paste, and finally adding about ten ounces of acetate of alumina, mixing and straining. The meat is kept in this bath for

* Paper pyroxiline made at 130° Fahr., with equal parts of sulphuric and nitric acids, well washed in many changes of water, and lastly, with two or three changes of *boiling* water.—*Photographic Journal*, Oct. 21.

about two minutes, being drawn and moved about in it by the string; it is then taken out and suspended in a current of dry air for about twenty-four hours. The process of immersion, &c., is then repeated once or twice, as may be considered desirable.

WHITE BRASS, OR UNOXIDIZABLE CAST IRON.

M. Porel, of Paris, has prepared an alloy which has the appearance and fracture of ordinary zinc, but it is as hard as copper or iron, and tougher than cast iron. It may be turned, filed, or drilled, as easily as those metals ; does not adhere to metal moulds, and retains its metallic lustre perfectly in a moist atmosphere. This alloy is prepared by melting together zinc, copper, and cast iron. It contains 10 per cent. copper, and 10 per cent. iron. This alloy may be used for various purposes in the construction of machinery; it may be made to appear like bronze, either by covering it with a deposit of metal, or by throwing up the copper superficially, and is, therefore, well adapted for casting vases, statues, and other objects of artistic character that are to be exposed to the atmosphere, especially as it is not a costly material.—*Mining Journal.*

OIL OF HORSE-CHESNUTS.

The "Abeille Médicale" mentions the oil expressed from horse-chesnuts as a specific for gout. The oil, well rubbed in, exerts at first a painful, but rapidly a sedative, effect; lint and oil-skin are then applied to the affected part. Evaporation is checked as much as possible, and perfect repose enjoined upon the patient. The treatment is said to be most successful.—*Lancet*, Oct. 30.

THE PREPARATION OF SPERMACETI OINTMENT.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Dear Sir,—Some time ago I addressed a letter to you, which appeared in your number for the present month, calling attention to the prevailing practice of employing lard in the preparation of Unguentum Cetacei. It also appears to have been read at the Pharmaceutical Meeting on Oct. 6, and to have been then followed by a conversation, which places the question at issue in a very false position. With the single exception of Mr. Francis's observation, that he had been accustomed to prepare white spermaceti ointment by making use of *bleached* olive oil, and without the introduction of lard, no reference seems to have been made to that which constituted the point of my letter. The subsequent conversation (as reported) was entirely confined to the propriety or otherwise of employing *bleached olive oil.* There are therefore, at the present time, *two* questions raised, neither of which, I submit, are sufficiently disposed of—

1st. Relating to the employment of *lard*, as referred to in my letter.

2nd. Relating to the employment of *bleached olive oil*, as referred to by Mr. Francis and others.

These two questions are of course perfectly distinct, and must each be discussed upon its own merits. It is to the first that I attach the greatest importance, because I believe it to be the most frequent, as well as the most injurious sophistication. I feel that the conversation at the last meeting, although it furnishes no reply to the substance of my letter, does, by affecting to ignore it, impose upon me the disagreeable necessity of substantiating the fact that lard *is* commonly used in the preparation of Unguentum Cetacei.

I have therefore obtained twenty-eight samples of spermaceti ointment:—viz. twenty-six from shops in Bristol and Clifton, including every establishment of any degree of celebrity,* and the remaining two from two of the most eminent houses in the west-end of London; and I venture to declare my conviction that the large majority of these contain lard in a greater or less proportion, and that there are twenty-four (if not twenty-six) out of the twenty-eight, in which olive oil cannot be easily and satisfactorily recognized. Two only of the samples appear to be made in simple conformity with the directions of the London Pharmacopœia. The subjoined table exhibits the most prominent characteristics of the several specimens ; and the specimens themselves have been forwarded to Dr. Redwood, for inspection by the Members at the next meeting of the Society.

* The twenty-eight samples do *not* include any prepared by myself.

Examination of Twenty-eight Samples of Spermaceti Ointment.

No.	Colour.	Odour.	Degree of Stiffness.	Effect on Blue Litmus.	Remarks.
1	Yellow.....	Olive oil	5	0	No. 2 appears to contain a smaller proportion of olive oil than No. 1. Hence perhaps its lighter colour and greater stiffness; hence also, probably, its action upon litmus, as it is likely that wax would acquire this property in the bleaching process, and its larger presence might allow its influence to come into play. This variation is sanctioned by the Pharmacopœia, which directs "*Olive oil, a pint, or as much as may be necessary.*"
2	Fainter yellow .	"	15	trace	
3	Yellowish white	Olive oil, less distinct	7	2	
4	" "	" "	6	5	
5	" "	Waxy	10	8	
6	Yellowish	Olive oil & lard (?)	6	3	
7	White	Oily odour, but not distinctly of *olive* oil; faint resemblance to castor oil smell	6	3	This is one of the London samples referred to *ante*, and is stated to be made according to P. L., *bleached* olive oil being used.
8	Dingy white ...	Greasy	8	3	This sample is stated to be made with lard and almond oil, instead of olive oil.
9	" " ...	"	8	7	This sample is stated to be made with olive and almond oils and lard.
10	" " ...	Oily	5	5	
11	Faint yellow ...	Nut oil	5	9	
12	Yellow.....	Disagreeable, seed oil (?)...	7	1	
13	Dingy white ...	Lard	7	4	
14	White	"	20	6	
15	"	"	14	3	
16	Yellowish	"	5	5	
17	White	Stale lard	12	10	
18	"	" "	7	8	This is the second London sample.
19	"	Lard	7	2	This sample appears to be *unadulterated lard!*
20	"	Tallow.....	8	2	
21	Dingy white ...	Strong lard.....	9	9	
22	" " ...	" "	7	6	
23	White	" "	15	1	
24	"	" "	10	1	
25	"	" "	12	3	
26	Dingy white ...	Offensive lard	10	5	
27	Yellowish	Perfumed	7	4	On moving this sample with a spatula aqueous drops appear.
28	White	"	14	4	The odour of this sample is very offensive when distinguished through the perfume, as when rubbed on the hand.

[*Note.*—It should be mentioned that some of the properties above specified require some management to detect them, and the memoranda above are at best but approximations to exactitude: *e. g.*, the odour of some specimens will not be satisfactorily made out except by rubbing a portion on the hand, which action also develops other peculiarities not quoted above, pointing to the presence of lard. The effect upon litmus also appears to be greatly controlled by the degree of stiffness of the sample, and the records are probably very far from accuracy under this head. The general fact, however, appears to be established, that in the specimens Nos. 1 and 2, which agree in general characters with a standard P. L. specimen, there is less acidity than in the other specimens, whether made from bleached oil or lard. The litmus was moistened with water, and subjected to contact with the samples for about twenty minutes before the changes were recorded. It is also fair to mention that an acid reaction is sometimes produced by the employment of certain foreign waxes which have been lately pressed upon Chemists' attention. I have found an experimental sample of this wax entirely spoil a whole batch of Unguentum Cetacei.]

The foregoing table speaks for itself; and leaving doubtful cases out of the question (although Nos. 8 and 9 prove that lard may be present in sufficient quantity to change the appearance of the ointment, without being sensible to the smell), when we regard the large proportion of samples described as distinctly smelling of lard, tallow, stale lard, offensive lard, it may surely be considered as proved, that the whiteness of spermaceti ointment is *generally* occasioned by the substitution of lard for olive oil. Whether so wide a deviation from the instructions of the Pharmacopœia is justifiable, or whether it tends to the improvement of the preparation, is the secondary stage of this question, upon which it will not be necessary for me to add anything to what was expressed in my former communication, to every word of which I most tenaciously adhere.

The second question, relating to the employment of *bleached* olive oil, although not raised by me, is one upon which I would take the opportunity of making a few remarks. We have often seen a great weakness exhibited in certain preparations, in favour of entirely arbitrary colours. I call them arbitrary, when they are no evidence of the quality of the article. Many instances will suggest themselves, but I will only mention *white* milk of sulphur, *white* oxide of zinc, *brilliantly red* oxide of iron. In these cases, and in my belief not less in spermaceti ointment, the favoured colour is always or generally an evidence of inferiority. In defence of the use of *bleached* olive oil, to attain this arbitrary whiteness in the Unguentum Cetacei, Dr. Redwood pleaded that the precise age and colour of the olive oil was not specified by the Pharmacopœia, and that if the public preferred a white ointment, it was right to gratify them. I apprehend that an *onus probandi* first lies upon those making the substitution of showing that the preparation is not deteriorated by the exchange; whereas the table before given appears to prove that the substitution is attended with the production of acidity in the product (vide Sample No. 7). But it is not fair to apply this special pleading ingenuity to the interpretation of the Pharmacopœia. The Pharmacopœia sometimes orders "wax," and it means *yellow wax;* it sometimes prefers "white wax," and it takes care to express itself accordingly. In like manner, if it intended *bleached* olive oil to be used in Ung. Cetacei, or oxidized (in plainer language, "rancid") lard in Ung. Zinci, it is reasonable to suppose that it would say so.

But the most important phase of this question is—Whether the bleached or unbleached oil is medicinally the most advantageous as an ingredient in an ointment intended to exercise a soothing and emollient influence. I have very little experience of ointment made from bleached olive oil. I have seen a hundred white spermaceti ointments (so called), but I believe I have never seen more than one specimen which owes its whiteness to bleached oil. That specimen is numbered 7 in the table, and I am assured that it is made strictly according to the Pharmacopœia, with the sole peculiarity of the employment of bleached olive oil. I can only express my opinion that it is a decidedly inferior preparation to Nos. 1 and 2, as regards its emollient properties when rubbed into the skin; it is decidedly less fresh in odour; the proprietors find it has a considerable disposition to deteriorate, and they keep a sharp look-out upon it, lest it should become unfit for sale; and, further, it exercises a decided reaction upon litmus, while the other specimens (Nos. 1 and 2) are neutral. Now, in the face of this, I never heard that anybody ever imagined that any real advantage was gained by the substitution of this bleached

oil. The sole object has been to make an ointment which shall look like the adulterated article, to which the public have been, under an evil usage, habituated, and as unlike the undoubtedly genuine article as possible. And it has this ill effect: that it contributes to make the public satisfied with a fraud, and suspicious of a verity.

I, therefore, heartily trust that the time is near when those—if any—who continue to use lard will be compelled to colour it with palm oil, or some other *pseudo*, rather than that those who wish to prepare a creditable article shall hesitate to show it in its true colours.

I am, dear Sir, yours very faithfully,

Clifton, Nov., 1858. RICHARD W. GILES.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—I beg to add the testimony of my experience in support of the entire contents of Mr. Giles's letter on "Unguentum Cetacei," published in your last number. The propriety of a coloured article, and its claims to superiority over all "beautifully white" substitutes, is a battle I have had to fight again and again during my pharmaceutical existence, and my chagrin has been excessive on some occasions to find, notwithstanding the certainty of being in the right, and my earnest arguments to that effect, that the usage of certain leading London houses, and of others who have had "first say," has been accepted as authority more worthy of trust.

I have no doubt Mr. Giles expected, as I, upon reading his letter, expected, that the emphatic denouncement which the mere mention of the substitution before the Society would certainly evoke, would be of a nature so plain and firm that for the future the public should have no choice but to recognize the genuine from the untrue, and the individual pharmacopœia-ist be relieved from the onus of proving himself innocent of fraud against the implied accusation of his supposed betters. Great, however, was my surprise and regret to observe so opposite a reception given to his complaint.

The Society's President, and the Society's Professor of Pharmacy, both endorsed the public prejudice in favour of a "beautifully white" article, though in support of their views they were driven to the necessity of advocating the employment of materials which, confessedly, had suffered both physical and chemical change, brought about by processes the most innocent of which was old age.

I am sorry Mr. Giles was not present on the occasion of the discussion, that he might have had the opportunity of defending his position, and maintaining the superiority of the P. L. application *prepared with fresh ingredients*; and I sincerely hope those eminent authorities above quoted (whose opinions generally I greatly respect), and others who have hitherto fostered a popular prejudice, will ere long hear so much to echo Mr. Giles's letter that they may deem it worth their while to institute a comparison, and conscientiously to adopt the right.

I am, Sir, your obedient servant,

7, Regent's Place, Clifton. G. F. SCHACHT.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—I can readily sympathise with Mr. Giles in the matter of Ung. Cetacei, because I too have been troubled by the doubts and fears of customers on this point, and have probably suffered more on account of a strict adherence to the instructions of the Pharmacopœia. I suspect, from a specimen I procured from Bristol a year or two since, that these unbelievers have been accustomed to an article made according to a time-honoured formula, namely, Lard ℔jss., Spermaceti ℔ss.,and Ol. Bergamotte, q. s. to cover the smell of the lard. Everybody acknowledges lard to be improper, and oil of bergamotte must be about as emollient as oil of turpentine. The study of the Journals has left an impression on my mind of a too frequent appearance of "trimming" on these questions—"white is not so white, nor black so very black"—and I think it beneath the dignity of the Professor of Pharmacy to the Pharmaceutical Society to pander to the perverted fancy of the public for white Ung. Cetacei, or white Ung. Zinci. Bleached olive oil may furnish a ready answer (and a refuge) for parties who have been in the habit of using lard and bergamotte, but, notwithstanding you, Sir, seemed considerately disposed to suggest that "something might be said on both sides," I find it hard to believe that the College of Physicians would sanction

the substitution of olive oil that had been exposed to light (and the inevitable heat) long enough to bleach it, for oil that was either fresh or had been preserved in a cool cellar. I do not care to grapple with Dr. Redwood, because he would, most probably, slip through my fingers, but I shall venture to think the use of bleached for yellow oil an interpretation of the instructions of the Pharmacopœia in a "non-natural" sense, and the sediment in exposed oil, at which the Professor catches, as a step towards acidity. I have seen castor oil "beautifully white" and quite rancid. There is a very popular notion that whiteness and purity are inseparable, arising probably from the study of the Scriptures, and encouraged by druggists who sell lard; but it would be well if Dr. Redwood were to assist us in preaching that Religion, like Philosophy, is not Pharmacy.

I am, Sir, your obedient servant,

Nailsea, Nov. 5, 1858. THOMAS POLLARD.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—I was glad to see in your Journal of this month a paper on "Spermaceti Ointment." I think the subject has not been agitated any too soon, believing that few preparations in daily use are prepared in so many different ways as that.

I think if Chemists generally would entirely discard the use of lard in its preparation, and follow the directions of the pharmacopœia, they would not find the public object to the colour, which would be overlooked in consideration of the superior emollient properties of the ointment.

Whether it is as correct to use bleached oil instead of the oil as expressed from the fruit, as ordered in the Ph. Lond., I leave for others to decide; but I think, when we have a preparation which leaves nothing to be desired (in the Ung. Cetacei, P. L.), I cannot see what advantage is to begained by using *bleached* oil; for although the oil, as bleached by the action of light, may remain uninjured, yet it must be obvious, that should its use become general, such a tedious process would soon be abandoned, and chemical agents employed some traces of which would be retained by the oil, and thus render it unfit for pharmaceutical purposes.

Apologizing for trespassing so long on your valuable time,

I am, Sir, your obedient servant,

3, *Market Street, Leicester, Nov.* 12, 1858. WILLIAM YOUNG.

TO THE PRESIDENT OF THE COUNCIL OF THE PHARMACEUTICAL SOCIETY.

SIR,—Will you allow me to state my entire concurrence in the opinion expressed by Mr. Giles, of Clifton, and read at the last Pharmaceutical Meeting on the subject of Spermaceti Ointment, and at the same time to avow my surprise that you, of all men, who in ninety-nine instances out of every hundred, I am happy to say, put into language far better than I could employ, my own views, should here—and here only as far as I know—seem to desert the high standard you have hitherto maintained of strict adherence, not only to the letter, but to the *spirit* of the Pharmacopœia? What are we fighting for but for a secure hold on the public confidence? To what other end are all our educational efforts directed? Yet this end must be defeated if liberty is permitted to deviate *at all* from instructions we profess to follow. Let those who deviate do so against *all* rule, and not with the appearance of sanction from an *imperium in imperio* of those high in influence and authority. Putting aside all "explainings away" and "non-natural constructions," who, without a previous bias, can possibly understand the College to mean other than the *freshest* no less than the purest oil, meaning by the latter term free from adulteration? And how can that oil be fresh that is bleached by light only, or be regarded as possessing the *purity intended* if bleached by any other means? I never purchased but one sample of such bleached olive oil—of a highly respectable house, and, I suppose, a fair specimen—and the best I can say of it is, that I would not use it when I got it two years ago, and of course not now, for any pharmaceutical purpose.

But the ointment of the Pharmacopœia, if well made and fresh, is not at all repulsive, but of a delicate and pleasing cream colour, which I find seldom objected to, nor do I think the colour only would be any impediment to its sale, if as the trade phrase is, I were to "push" or recommend it. But I do not, for, like most of my brethren, I make and sell far more of a "beautifully white" ointment. It contains neither olive oil nor lard, nor anything whatever that can possibly be objected

to in a professed substitute; but as it differs in all its proportions and some of it ingredients from the preparation of the Pharmacopœia, *as such only I sell it*, and never use it in dispensing. Conduct of this kind, wherein no one is deceived or misled, I apprehend to be perfectly legitimate; but I would elicit observation, and am willing to submit to correction. Yours respectfully,

THOMAS LOWE,

Nov. 13*th*, 1858. 166, *Islington Street, Liverpool.*

[The observation to which Mr. Lowe objects must have been misunderstood. No deviation from the Pharmacopœia was recommended or sanctioned, but the remark was to the effect that the precise colour of olive oil is not defined in the Pharmacopœia; that oil of the same quality varies sometimes in colour, and supposing the properties of the oil to be unimpaired, a shade of colour would not make it more or less in accordance with the Pharmacopœia. Each Chemist naturally endeavours to produce the best preparation, and it is an object of ambition to obtain a result which not only in its medical properties, but also in appearance, shall be unexceptionable. In this respect one manipulator shows his superior skill over another; but if any means be used to improve the appearance at the expense of the quality of the results, this could not be justified.—ED.]

COMPOUNDS OF IODIDE AND BROMIDE OF MERCURY WITH THE ALKALOIDS.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—I observe by Mr. Groves's letter in your last Journal, that he has withdrawn his claim to the discovery of the double iodides of mercury and the alkaloids, but at the same time he expresses an opinion that I have entirely failed to understand the subject, apparently because I have not indicated the ammonia compound exactly analogous to these salts; and lest any of your readers shall entertain the same belief, I am desirous now to supply the omission. For this purpose no tedious search through the various chemical journals is necessary—the first text-book to hand will suffice.

These salts, then, may be represented generally by the formula Alk H I + 2 Hg I, and the ammonia analogue by $N H_3$ H I + 2 Hg I, which Mr. Groves tells us he could not succeed in producing, obviously leading his readers to infer that it is yet unknown, although methods of preparing it have been long since described by Brande,* Gmelin,† and others.

Having now pointed out, in the first place, that the supposed new iodine salts are old acquaintances, and in the second place, that the ammonia analogue which Mr. Groves unsuccessfully sought for, is an old acquaintance too, long ago catalogued in the manuals, I have only to add, that as this correspondence seems to have reached a point from whence it can present little interest to your readers, I take my leave of the subject.

It remains, however, for Mr. Groves to exonerate himself from the supposition that he has presented a paper to the Chemical Society in which the labours of previous Chemists, in the same field of inquiry, have been strangely ignored.

I am, Sir, your obedient servant,

68, *Broad Street, Worcester, Nov.* 10*th*, 1858. J. DYSON PERRINS.

WHOLESALE POISONING BY ARSENIC AT BRADFORD.

ON Monday, November 1, the town of Bradford was in a state of great excitement in consequence of a report that a great many persons had been poisoned by eating lozenges in which arsenic had been accidentally mixed, and which had been sold in the Green Market on the Saturday night. On Sunday morning, a report was brought to the police office that Elijah Wright, aged nine years, and Joseph Scott, aged fourteen, had died suddenly on Saturday night, about 11 o'clock. It was at

* Brande's *Chemistry*, 6th edition, vol. i., p. 986.—"Hydrargoiodide of Ammonium."

† Gmelin's *Chemistry*, edit. Cav. Soc., vol. vi., p. 82.—"Iodide of Mercury and Ammonium." It is manifestly immaterial whether the ammonium theory be adopted or not.

first supposed that they had died from cholera, but during the day many other persons were attacked with illness, and on inquiry it was found that they all had partaken of lozenges purchased on the Saturday night. This led to the fact that the lozenges had been sold by a man named Hardaker, who keeps a stall in the market, and who had bought them of Mr. Neale, a wholesale confectioner, residing in Stone Street, Manor Row. Further investigation confirmed the suspicion that the lozenges were the source of the mischief, and, upon a cursory examination, they were found to contain arsenic. Prompt measures were immediately adopted by Mr. Leveratt, the chief constable, and Mr. Copeland, superintendent of police, to prevent the spread of the calamity. All the officers were sent round their beats to warn the public, bellmen were sent out for the same purpose, and placards were posted in every part of the town and neighbourhood, requesting any persons who had purchased lozenges to bring them to the police-office. About 36 lbs. were recovered from Hardaker, and a considerable quantity were brought in by people who had purchased them on Saturday night. During the day, reports were received from all parts of the town and neighbourhood of the fatal effects from the use of the lozenges, and it was impossible at that time to estimate the extent of the evil. The number of fatal cases reported was fifteen, and the number who suffered severely from the effects of the poison was reported as above 100. From the evidence given before the magistrates on Tuesday, November 2nd, it appears that James Archer was sent by his master, Mr. Neale, the confectioner, to Mr. Hodgson, druggist, at Shipley, for what is technically called "daff," which is sulphate of lime. Mr. Hodgson being ill in bed, the young man, William Goddard, aged eighteen years, went up-stairs to ask where it was kept. Mr. Hodgson told him that the man had better wait till he could attend to it himself; however, as he particularly wished to take it with him, Goddard went again to his master, and was told the "daff" was in a cask in the corner of the attic. He found a cask containing something white, which he concluded was the article required, and accordingly weighed 12 lbs. of what he thought was "daff," but which, in reality, was arsenic, and which he delivered to Archer, who took it to Mr. Neale's workman, James Appleton, by whom it was mixed with "4 lbs. of gum and water, 1½ oz. of essence of peppermint, and about 40 lbs. of sugar," and made into lozenges, and delivered in four parcels to Hardaker. While making the lozenges, Appleton had suffered severely with sickness from one o'clock till nine at night, without any suspicion of the cause. The lozenges were brought to Hardaker by Neale, who said, "They are not as good in colour as usual, but they are equal in quality;" he therefore agreed to take 7½*d.* per pound instead of 8*d.*, the price previously agreed on. The lozenges were then spread out upon the stall, and the deadly sale commenced, at the rate of two ounces for three-halfpence!—most of the purchasers taking two ounces, on account of the price. The proceedings before the magistrates at the Court House, Bradford, commenced Monday, November the 1st, Goddard (Mr. Hodgson's assistant) being at that time the only party in custody. Mr. Leveratt, the chief constable, having stated the nature of the case, applied for a remand, in anticipation of further evidence resulting from the measures adopted for giving publicity to the facts. The mayor complimented Mr. Leveratt on the prompt measures he had taken, and remanded the prisoner. On Tuesday the case was resumed. Inspector Burnieston deposed, that on Sunday evening he had gone to Mr. Hodgson's, and on examining the loft where the arsenic was kept, he found the cask containing it on one side, but two or three yards from the corner of the room. He looked for a label, but could find none. It had not occurred to him that the cask might be labelled on the bottom, which was afterwards found to be the case, as it was too heavy to be easily turned up, being about 2 cwt. The "daff" was in a similar cask, in the corner of the room. Mr. Hodgson came in at the time and pointed out the arsenic cask, on which witness took Goddard into custody. Neale stated in his evidence that when lozenges were required at less than 10*d.* per lb., he used "daff," and that these were ordered by Hardaker at 8*d.* per lb., and could not be made at that price without "daff." "Daff" was not sulphate of lime, but a preparation from burnt spar. Costs about 7*s.* 6*d.* a bag of 2 cwt. Sugar costs 6½*d.* or 6¾*d.* per lb. He did not wish to use it, but others used it in much larger quantity than he did. In Glasgow there was a union among the confectioners to prevent the use of it, and he had also agitated to get others to discontinue its use. He did not consider it cheating. He had made lozenges at 7*d.* per lb., but had refused to make below that. He had been offered an order at Manchester to make a quantity at 5*d.* per lb., but had refused, stating

that any one making such an article deserved severe punishment! Some of the batch, after the lozenges were made, was put into jars containing Scotch mixture, and an attempt had been made to separate it; but the police took possession of the whole stock, amounting to about 50 lbs., to prevent further accident. Mr. Bell, surgeon, stated that he had found, on examination, conclusive evidence of the presence of arsenic in the lozenges. Mr. F. M. Rimmington, chemist, also analyzed a sample of the lozenges, and found them to contain arsenic in very considerable quantity. He did not estimate the quantity in each, but was satisfied there was a large quantity. Taking the estimate of the quantities of materials as stated by Neale to the police, as employed in making the lozenges, and supposing them to be equally distributed, each lozenge would contain 9½ grains of arsenic. James Appleton, assistant to Mr. Neale, stated that while mixing the lozenges he felt very unwell, and in riddling them on one occasion there was such an attack of sneezing that his master asked if any ginger or Cayenne pepper was in use. The lozenges were of rather darker colour than usual, but he attributed this to the gum; there was no inducement to pick the gum carefully, as the lozenges were to be retailed at two ounces for 1½*d.*

We have only thought it necessary to give the prominent facts in the evidence, which is very voluminous. On Friday, Nov. 5th, Hodgson and Neale having been clearly implicated in the transaction, were committed, as well as Goddard, on the charge of manslaughter, but were admitted to bail. On Saturday, Nov. 6, an inquest was held on the body of Elizabeth Mary Midgley, aged seven years, who, from the evidence adduced, was proved to have died from the effects of eating some of the lozenges. Mr. Rimmington made an analysis of the contents of the stomach and intestines by Reinsch's process, and obtained distinct evidence of the presence of arsenic. He also made several analyses of some of the lozenges, from which it appears that the weight of each lozenge was 43½ grains, and that the quantity of arsenic in each varied from 11 to 16 grains. The proportion of arsenic, on the average, was about one-third of the lozenge. Mr. Rimmington also examined some coloured portions of the Scotch mixture, from one of which, a yellow lozenge, he scraped a considerable quantity of chromate of lead, also a poisonous substance. He considered sulphate of lime comparatively inert, but if taken repeatedly in the quantity in which it was used in the adulterated lozenges, it might produce serious consequences to the health.

The proceedings at the Borough Court, and the inquests on the bodies of the deceased, lasted altogether from the 2nd to the 12th of November. The total number of deaths ascertained to have taken place is twenty, and upwards of two hundred persons have been more or less severely attacked by illness occasioned by the lozenges. There is reason to hope that this is the extent of the mischief, or nearly so, as the quantity of lozenges seized by the police, together with those brought to the station by the purchasers, amounts to very nearly the entire quantity of which the batch of lozenges is estimated to have consisted. A letter from Mr. Rimimngton to this effect appeared in the *Times* of Nov. 10th.

A subscription has been opened for the relief of the families of some of the sufferers who are in necessitous circumstances; but it has been found necessary to caution the public against giving money to strangers with this object, as many impostors are already in the field, taking advantage of the occasion.

DEATH FROM LAUDANUM.

On Friday, November 5th, Mr. Wakley held an inquest in the Marylebone Workhouse, on Richard Vaughan, aged 66, late of 32, Saville-street, who died from the effects of laudanum taken for the purpose of alleviating pain. It appeared that the deceased had been for some time past in great suffering through the formation of an ulcer in the socket of one eye. To obtain relief he usually took laudanum, which so far had the desired effect that it procured several hours' insensibility at a time. The laudanum he frequently took two and three times a day, and he managed to procure a large quantity of laudanum by purchasing it in small doses and saving them up until they amounted to two or three ounces. On the day before his death he took an excessive dose, which threw him into apparently a deep sleep, but his wife, at length becoming alarmed at his insensible condition, sent for Mr. Clapp, surgeon, of Titchfield-street. Mr. Clapp found the unfortunate man in an unconscious state, and groaning very much. He did everything in his power to save life, but after remaining in the same state of stupor for many hours afterwards, the sufferer expired. Death

was clearly proved to have been occasioned by an overdose of laudanum, and the jury, after the coroner had commented upon the distressing nature of the case, returned a verdict accordingly. A bottle containing some laudanum was found in the deceased's boot, and there appeared to be no doubt that he took very large quantities to procure relief from pain.

POISONING BY CYANIDE OF POTASSIUM.

On Monday, October 25th, Mr. Wakley, the coroner for Middlesex, held an inquest at the Belvidere Tavern, Pentonville Hill, respecting the death of George Lewin, aged 29, lodging at 7, Hermes-street, Pentonville-road, who was found dead in his bed, from the effects of cyanide of potassium. It appeared from the evidence that the deceased was what is known as a draper's tallyman, and had only lodged in the house a few weeks. On the morning in question the landlady went up to his room about eight o'clock to call him, but obtained no answer, and, upon an entrance into the room being effected, he was found to be dead. A bottle labelled "Poison" was found upon the table, and beside it a tumbler, which evidently had contained some of the contents of the bottle. It appeared from the evidence of the medical gentleman that death had been produced by cyanide of potassium, which is largely used by photographers, and hence easily procurable, and almost as dangerous as prussic acid itself. There was sufficient disease in the head to account for a suicidal state of mind. The jury returned a verdict that the deceased was of unsound mind.

SUICIDE BY OXALIC ACID.

On Tuesday, November 9th, Mr. Wakley received information of the suicide of Mr. James Moore, of 26, Little St. Andrew's Street, Seven Dials, aged 42 years. It appears that Mr. Moore went to Mr. Roberts's shop and purchased a large quantity of oxalic acid. The deceased was found writhing in agony, and Mr. Weeks, surgeon, advised his removal to St. Giles's Workhouse, where he gradually sank and expired. No cause is assigned for the act.

BOOKS RECEIVED.

The Student's Laboratory Guide. By Dr. J. Baker Edwards, F.C.S., &c., &c. Liverpool: Edwards & Wharrie, Berry Street.

Hints to Craniographers. By J. Aitken Meigs, M.D., &c. Philadelphia: Merrihew & Thompson, Printers, Lodge Street. 1858.

Experimental Inquiry into the Composition of some of the Animals fed and slaughtered as Human Food. By J. B. Lawes, F.R.S., F.C.S., and J. H. Gilbert, Ph.D., F.C.S. London: Printed by Taylor & Francis, Red Lion Court, Fleet Street. 1858.

Letter on the Utilization of Town Sewage. By J. H. Gilbert, Ph.D., F.C.S. Nottingham: Printed by J. N. Dunn, Market Place.

First Report of the Committee of the Ladies' National Association for the Diffusion of Sanitary Knowledge.

We had occasion to notice this Association at the time of its formation, and are now glad to find from the Report that, after passing though the difficulties attending all new undertakings, it is now fairly established, and with a prospect of a wide sphere of usefulness.

Poisoning by Nicotina, *with Remarks*. By Alfred S. Taylor, M.D., F.R.S.

TO CORRESPONDENTS.

T. B. (London) sends a copy of a prescription which was brought to him by a stranger, to be prepared, and asks whether he was wrong in refusing to prepare it, having no means of access to the prescriber: ℞ Morph. Mur., gr. i.; Liq. Opii sed., ℥ii.; Aquæ, ℥x.; ♏; signa "the night draught."

[In the absence of any information as to the nature of the case, he did right in refusing. When medical men order such extreme doses, they should write a note or some explanation to satisfy the dispenser that they really mean what is written, or the patient should produce evidence that it is an exceptional case. Supposing the quantities to have been written by mistake, in the event of a fatal result, the

prescriber would blame the Chemist, and say, "He ought to have known it was a mistake."]

A Member (London, W.C.).—The communication has been forwarded to the Pharmacopœia Committee.

A Member has sent us the report of a case of a Chemist's Assistant charged by his employer with being drunk behind the counter, and persisting in making pills with morphia, &c., while in that state. No advantage could arise from publishing the particulars of such a case. For what purpose it was brought before the magistrate we cannot imagine. The drunkard should simply have been turned out of the house.

A Correspondent has directed our attention to the following remark on the Bradford case in the *Dublin Medical Press*:—"What beautiful confectionary this must have been for poor children, their stomachs filled with plaster of Paris; but no doubt Mr. Jacob Bell will excuse the Chemists." [This is a silly remark; there was no Chemist concerned in the transaction; the parties were a confectioner, a lozenge retailer, an assistant, an errand-boy, and a druggist, not a Chemist.—Ed.]

We have to thank several correspondents for communications and information respecting the Bradford disaster, especially Mr. Rimmington and Mr. Rogerson of Bradford, and Mr. Wilkinson of Manchester.

Excelsior is thanked for his communication. The subject is a good one, but could scarcely be confined to Pharmaceutists of the past, as their number would be too small for a series of papers; and if those still living were included, the difficulties would be obvious.

A. C. B. (Chesterfield).—*Medical Galvanic Coil.* Vol. xvii., pp. 33 and 182.

T. (Sheffield).—Balfour's *Manual of Botany.*

G. R. (York).—*Tincture of Sumbul.* Vol. xv., p. 508.

W. P. (Mold).—Morton's *Manual of Veterinary Pharmacy.*

An Apprentice (Newcastle-on-Tyne). *Latin Pharmacopœia*, Fownes's *Chemistry*, and Royle's *Materia Medica.* On receipt of name and address, full particulars will be forwarded through the post.

T. H. B. (London).—The preparation called "Liquor Opii Sedativus" was originally made by Mr. Battley, and soon acquired a wide celebrity, which led to several imitations, some of which are by their makers said to be identical with Battley's. If liquor opii sedativus is ordered, and Battley's preparation is not specified, it would be justifiable to use that of another maker, provided it was the same in composition.

Sigma (Leamington).—(1.) If the hydrated oxide of iron of the Pharmacopœia be used in making *Tinctura Ferri Sesquichloridi*, it is entirely soluble, but much of the oxide of iron of commerce has been subjected to heat, and thus its solution is rendered difficult.

(2.) ℞ Aqua Flor. Aurant ℥iss.
Soda Bibor. ℈i
Olei Amygdalæ Dulc. ℥ss.
Aquæ ℥vi. ♏

If mixed in the above order forms a perfect emulsion.

(3.) We know of no published analysis of the common blackberry.

W. C. H. (Halifax).—Balfour's *Outlines of Botany.* A. & C. Black, Edinburgh, 7*s.* 6*d.*

Juvenis (South Devon).—The plan mentioned might answer the purpose.

S. (London).—(1.) Fuller's earth consists principally of silica and alumina, with oxide of iron. (2.) We are unable to give the information.

Index (London, E.C.).—Should send the name and address of the delinquent to the Council.

R. C. H. (Chipping Norton).—*Phosphorus Paste.* If the directions, given in this Journal, vol. xii., p. 402, are followed, no difficulty will be found in making it.

C. M. (Manchester) is thanked for his communication; the subject will receive attention.

Instructions from Members and Associates, respecting the transmission of the Journal, before the 25th of the month, to the Secretary, Elias Bremridge, 17, Bloomsbury Square, W.C.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington Street. Other communications to the Editor, 15, Langham Place.

THE PHARMACEUTICAL JOURNAL.

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THE PROGRESS OF THE MEDICAL COUNCIL—REGISTRATION—THE GENERAL INTERESTS OF THE PROFESSION—THE PHARMACOPŒIA—ENGLISH PRESCRIPTIONS.

It is not the least sagacious feature in the new Medical Act that it is so framed as to beg the question which has been the principal source of dispute and difficulty during the protracted struggle for medical reform—namely, the settlement of the relative positions of the several ranks or grades in the profession. This has always been the great bone of contention. For many years the Oxford and Cambridge graduates in the College of Physicians were in the almost exclusive enjoyment of the full rank and title of Physician, granting their licence by courtesy to the graduates of other universities, but constituting them an inferior grade. The universities of Edinburgh and Glasgow, more recently that of London and some others, by devoting special attention to medical education, became formidable rivals of Oxford and Cambridge; and the licentiates' grievance became the prominent evil which engaged the attention of Mr. Warburton and other medical reformers. By degrees, the College relaxed in the severity of its regulations, adopted a more liberal policy, and took the wind out of the sails of its opponents. Then the Apothecaries of England, a most useful and intelligent class of practitioners, constituting numerically a very large majority in the profession—the physicians of the poor, and, indeed, to some extent of the middle classes also—complained that they were denied access to posts of distinction and honour either in the College of Physicians or the College of Surgeons, and degraded to the position of professional tradesmen. To heal their wounds and redress their grievances, the one-faculty scheme was contrived, which was to wipe away distinctions, and make every medical man a doctor. Minor differences between the several universities, cliques, and parties in the profession, and disputes between the members of the College of Surgeons and the Council, with a few other complications, involved the question in such confusion, that a settlement of the affairs of the profession was almost despaired of as hopeless—until the Gordian knot was cut by the passing of the Medical Act, which throws on the Medical Council the responsibility of filling up the blanks in the programme.

The Registers under the Medical Act re-open some of the vexed questions relating to rank and title. The difficulty became manifest on the motion being made as to the mode of filling up the column denoting the titles of practitioners (reported in another part of this number, page 384), and we think the Medical Council exercised a wise discretion in delaying the final settlement of so important and delicate a question. Some little inconvenience may possibly arise from this delay, as we have heard that some practitioners have declined to register until they are informed in what company they are to be placed, and by what title designated; but the Council has many other duties to perform, the judicious exercise of which will increase its influence, extend its power, and thus enable it with better grace to lay down the law on this delicate point, than it could have done as a newly constituted body, consisting of Members from remote parts of the kingdom, meeting for the first time to decide upon questions requiring the most mature and patient deliberation.

The General Interests of the Profession will from time to time claim the attention of the Medical Council, and in proportion as this court of appeal is referred to and found to be efficient and ready to exert its influence in the right direction, that influence will increase, and the practical utility of the Medical Act will be made manifest. The Act *in itself* is of little value, but it confers upon the profession a system of machinery and self-government, by means of which all its members may be identified, its affairs regulated, and its interests

protected. The resolution to apply to Government for a repeal or reduction of the stamp duty on diplomas, is a good commencement. The only pretext which could ever be urged in favour of such an infliction, was the monopoly which at the time of Henry VIII., and for some time after, was conferred on the few men who were then licensed to practise, and who, it might probably be said, could afford to pay handsomely for such privilege. But the circumstances of the profession are changed—a more liberal policy has been introduced—the profession is thrown open to all who may come forward before the proper authorities and prove themselves to be qualified, and justice demands the repeal of this tax, or its reduction to a merely nominal amount.

The Pharmacopœia has very properly occupied a prominent position in the proceedings of the Medical Council at their first session. This was a question, on the urgency of which there could be no two opinions in the profession, and even the public had begun to take an interest in it. The fact that a journey from London to Edinburgh or to Dublin would make a difference of 50 or 100 per cent. in the strength of a medicine prepared by the same prescription, with a few other incongruities of a like nature, some of the preparations being among our strongest poisons, required no further argument to demonstrate the urgency. The Medical Council has, as we anticipated, adopted a course which will secure the services and the result of the experience of all the medical and other bodies, previously interested or occupied in the work; and the London sub-committee, among whose members are the representatives of these bodies, has already held several meetings, and given evidence of the intention to proceed in earnest, and with all possible expedition. It must not be supposed that the appointment of this committee has superseded the consideration of the subject by the Pharmaceutical Society. On the contrary, the Society is officially requested to continue its committee, and to communicate with the committee of the Medical Council, through its delegate, Mr. Squire. It is therefore evident that something is expected from the Society. It is known and admitted that the Society consists of practical men, who ought to be acquainted with the subject, and competent to give useful information. The Members have now not only the opportunity of proving the value of their services, but a responsibility is thrown upon them, from which they cannot shrink without disgrace. There are many preparations in the Pharmacopœia which the experienced Pharmaceutist must know to be capable of improvement, or which might be introduced for discussion at the Pharmaceutical Meetings with prospect of advantage. Among other subjects which ought to be seriously considered by the Society, we may refer to the weights and measures. Without doubt there are advocates of an entire change, either by the adoption of the decimal system, as employed on the Continent, or some other system altogether new. No such change ought to be permitted until it has passed the ordeal of a mature consideration by the Pharmaceutical Society. The theoretical calculator may in his study frame a scale of weights and measures, which on its intrinsic merits may seem to be absolutely perfect. But that is not all that is required to make it desirable. Such system or such change, whatever it may be, must be submitted to the scrutiny of practical men. For example, the proposition of Mr. Warder, described in his paper read at the last Pharmaceutical Meeting, considered by itself, might appear worthy of being entertained, but we must not forget that another system of weights is already in force, that no change of this nature could possibly be effected on a sudden, and we must therefore not forget the inconvenience and danger that would exist during the period of transition. For example, supposing this change to be adopted, a scruple in 1858 would be twenty grains, in 1859, ten grains; a drachm in 1858, sixty grains, in 1859, 100 grains; an ounce in 1858, 480 grains, in 1859, 1000 grains. Let us imagine the perplexity of a dispensing Chemist for several years to come, when a prescription is placed before him, ordering in a mixture or box of pills, a scruple of morphia, a drachm of opium, an ounce of tincture of senna, &c. In the case of some strong medicines, it may be a question of life and death; in many instances of serious injury, whether the quantities be interpreted accord-

ing to the old scale or the new; and no Chemist could possibly ascertain with certainty for ten years to come at least, whether the author of a prescription has adopted the new system or not; still less could he guard against the probability of mistakes in prescriptions from the habit of prescribing in certain doses under the old régime. The discussion of the proposition, however, is useful, as it enables us to see at once, and to demonstrate, the nature of the change to be especially avoided, namely, such as to give familiar terms a new and consequently a double meaning. We have heard it suggested that the introduction of the Centigrade thermometer, instead of Fahrenheit's, might be an advantage. This, also, is a question requiring much consideration; and before any such change is adopted, it ought to be fully discussed by the Society. The decision to publish the Pharmacopœia in English has been commented upon in some of the non-medical journals as an indication of the intention to banish the Latin language altogether from pharmacy and from prescriptions. This is a subject which amateurs are not able to understand. In every profession or trade there are signs and symbols and modes of expression which experience has shown to be convenient, and which to the initiated save much time and trouble. But we are told that the Latin language ought not to be used in prescriptions, because many of the persons who are expected to read prescriptions do not understand Latin; and so, instead of obliging all dispensers of prescriptions to make themselves sufficiently acquainted with that language to perform their duty with safety to the public, the language of prescription is to be reduced to the level of the dunce or the ignoramus who never went to school; and in the hands of such persons, whose minds have never been trained by a liberal education, the duty of dispensing life and death is to be entrusted!! We are also told by the amateur writers in newspapers on this subject, that contractions are not to be used in prescriptions. And why not? Is Ext. Col. Co. less intelligible than Extractum Colocynthidis Compositus? Is h. s. s. p. r. n. less likely to be understood than "to be taken at bed-time when occasion requires?" Those who are accustomed to read and dispense prescriptions, know perfectly well that a Latin prescription is more easy to read than an English one, and that the contractions, instead of increasing the difficulty, enable the dispenser to see at a glance the whole contents of the prescription, instead of wading through a number of long words, which, in proportion to the increased time they occupy to write, are likely to be less well written. We have often seen prescriptions in which the formula was written in Latin, with the contractions in the usual way, and perfectly clear to be read at a glance, but the directions were written in English, and so entirely illegible, that it was necessary either to write on the label "to be taken as directed," or to ask the patient, if present, whether the doctor gave the instructions for taking the medicine. The question of English or Latin prescriptions has no reference to any supposed mystery. It is purely a matter of convenience, both to the prescriber and the dispenser, and also it is a circumstance of no small importance that a Latin prescription can be understood almost all over Europe, which is not the case with an English one.

THE BATTLE OF THE —OPATHIES.

A RATHER amusing trial of strength between Homœopathy and Allopathy took place on the 2nd of December, at a meeting of the Members of the Medical Institution, Liverpool. The object of the meeting was to discuss and decide upon a proposal to add the following words, of which notice had been given, to one of the existing laws of the Institution. "But any one practising homœopathy shall be ineligible, either as a Member of the Institution or as a subscriber to its library: and any regularly elected Member or subscriber subsequently becoming a practitioner of homœopathy, shall, *ipso facto,* cease to be a Member or subscriber to the Institution."

It transpired in the course of the discussion that there are already on the list of Members two who practise homœopathy; and that at a recent soirée, to

which all the legally qualified practitioners of the neighbourhood were invited, five or six gentlemen were present who are more or less identified with that line of practice. Several of the very orthodox members of the profession had felt annoyed at being obliged thus to associate with persons who had been designated by some of them as empirics and charlatans, and in anticipation of the meeting of the British Medical Association being held at Liverpool next autumn, the new law, it is said, was designed as a means of excluding the homœopathic fraternity from associating on equal terms with the members of the medical profession.

Had the issue been taken upon the abstract merits of the original and undiluted doctrines of Hahnemann, the question would have been a simple one, and the result certain, for very few even of the professed homœopaths bind themselves implicitly to the notion that a majority of diseases are traceable to suppressed itch, that medicines in infinitesimal doses actually produce the long catalogue of symptoms attributed to them by the great founder, in his original report of his experiments on himself, and all the other extravagant doctrines of the system. Nor do they even bind themselves always to adhere to the practice of the minute doses. The intricacy of the question has greatly increased by the "sliding scale" introduced by those gentlemen who "run with the hare and hunt with the hounds"—who, having taken a legal position as medical practitioners, and finding that in certain rather aristocratic circles homœopathy is in favour (or, to use plain language, PAYS), so cleverly balance themselves between the two opathies, that, on whichever side they are attacked, they slip through the fingers of their assailants.

Nor did the merits of these amphibious practitioners, or of the sliding scale, come directly into the discussion, but the question chiefly debated was, the propriety or otherwise of excluding legally qualified medical men from a medical institution, on the ground of any peculiarity or novelty in their doctrines or mode of practice; and some of the strongest opponents of the new law took the ground, that on the broad principles of science, philosophy, and justice, the truth could afford to find its own level, and that the passing of a law, especially intended to exclude homœopaths, would *do them good*, give them notoriety, create public sympathy in their favour, and betray an appearance of fear (that is to say, of weakness) on the other side. It was a question of tolerance *versus* persecution. On the side of homœopathy, the cases of Harvey, Jenner, and other men in advance of their time, were cited; on the other side, St. John Long, Joanna Southgate, and other quacks, who were puffed into notoriety by persecution; but both these arguments, though advanced by opposite parties, tended in the same direction—namely, against the proposed new law. It was also noticed that the new Medical Act discountenanced the principle of depriving a man of his business on account of any peculiar theory of medicine or surgery. The following amendment was moved:—

"That the members of the Medical Institution do not consider it just or expedient to deprive any legally qualified practitioners of the privileges of the Institution solely on the grounds of the medical opinions they entertain; and they feel confidence that the present laws are sufficient to maintain the honour of the profession."

This amendment, however, did not confirm the apparent union of opposing elements, for, on being put to the vote, it was lost—the number being *for*, 29; *against*, 41. The original motion was then put, and the numbers declared to be —*for the motion*, 40; *against it*, 27. The laws of the Institution, requiring that there must be a majority of two-thirds of the members present to carry any new law, the motion was lost by 14—the number required being 54. It results from this decision, which has been erroneously reported as a triumph for homœopathy, that the members of that fraternity are not, *de facto*, excluded from the Medical Society of Liverpool, but each candidate must stand or fall on his own personal merits and the result of the ballot.

A recent trial in Paris has been no less incorrectly represented as a triumph of the medical profession against homœopathy. The case arose out of a review

of a homœopathic pamphlet in *L'Union Médicale*, undertaken at the request of the author, but castigating his doctrines in severe and plain language. The author of the pamphlet was not the plaintiff, but the fraternity so winced under the lash of the review, that a committee was formed, by whom it was decided that twelve of the members should bring an action against the journal, the damages being laid at £2000. The case caused great excitement in Paris, and the trial occupied several days. After much eloquence on both sides, the verdict was given for the defendants, namely, the author of the review and the editor of the journal. The verdict was mainly founded on the facts that the article made no direct allusion to any particular person; that the twelve homœopaths had no legal claim to form a body of plaintiffs, and that discussion on scientific subjects was perfectly free and unrestrained.*

This verdict, as well as the late decision at Liverpool, leaves homœopathy and allopathy were they were, neither being any better or any worse for such decisions, but each standing on its own merits.

Homœopathy is on different grounds with the profession and with the public. With the profession it is a question of philosophy and medical science, with the public the only point of interest is the result.

Before any question of philosophy or science can be fairly discussed, it is necessary that both parties should agree as to the meaning of the terms essential to a clear understanding of the arguments. The question "what is Homœopathy?" was asked early in the late discussion at Liverpool, but no satisfactory answer was given. It must be understood, however, in the absence of any official recantation, that the term homœopathy comprises all the tenets and doctrines laid down by the founder of the system, and published by himself and his immediate followers. But when any of the glaring absurdities of the system are pointed out, or demonstrated by illustrative cases, we are told by the "sliding-scale homœopaths" that these are points on which they do not insist; that, as a whole, the system of the great Hahnemann is a glorious system, but they do not pledge themselves always to give infinitesimal doses, or to follow the intricacies of the doctrine in all their ramifications—in other words, they are homœopaths or allopaths according to convenience, as St. Paul was "all things to all men, that he might gain some," a remark which is often misquoted, as a supposed extenuation of double-dealing. This mode of shifting their ground is a proceeding to which the medical profession take exception, on account of its dishonesty. A medical man is not obliged to write a book, or to publish the details of his cases, or to found a theory upon the same; but he who volunteers such information avowedly for the advancement of philosophy and medical science, and who nevertheless obtains his results by other means which he does not divulge, or by the means usually adopted by other practitioners which he does not avow, that man is a quack and an impostor. His hypothesis is a falsehood, and his deductions consequently fallacious.

The public do not descend into the philosophy of the question. A patient says, "What do I care? I was ill, and went to several doctors, who gave me a quantity of odious physic. I then found a man who gave me a powder which I could scarcely see, to be dissolved in a tumbler of water, and a teaspoonful taken night and morning. They tell me he is an impostor, because one day he let me take a dose of castor oil, and several times he assented to my taking my morphia pills. But what does that signify? I am well, and whether I was cured by the castor oil, the morphia, or the invisible powder, is nothing to me."

The "sliding scale" doctor says to himself, "That was a successful case. I saw clearly he was over-dosing himself. Morning, noon, and night, never satisfied unless he was taking medicine. He would grudge a fee unless he had something for his money. That powder answered well: it amused him. True, I let him have some other medicines in rather stiff doses when I saw he required them, but I am not pledged to give only homœopathic doses. The theory sounds attractive: *it takes*. So long as I cure my patients, and get the fees, the

* *Lancet*, December 18.

modus in quo is my affair. Some of those fellows are jealous, no doubt, and want to know how I do it. Let them find out, as I did. The fact is, people like a little humbug, only you must not let them see through it, for that wounds their vanity."

This system of philosophy may be compared to that of the Great Wizard of the North, who pretends to extract so many plum-puddings from a hat. In reality they are handed to him from some secret receptacle known only to himself and his accomplice. The audience pay their money. They are pleasantly deceived, and they go home satisfied.

There is one article in the homœopathic materia medica which we think rather good—namely, the cocoa; but this is not taken in the usual homœopathic doses—the dose recommended being two teaspoonfuls in a teacupful of milk or milk and water.

JUVENILE ASSOCIATIONS.

Solomon tells us that "there is a time for all things," and we learn by experience and observation that youth is not the period of life during which studious habits, profound thought, and a propensity for labour, are most likely to be found. St. Paul says—"When I was a child I spake as a child, I understood as a child, I thought as a child; but when I became a man, I put away childish things." Such being the general rule with regard to the tendencies and habits at different periods of life, it is satisfactory to observe many striking exceptions, which, while they are creditable to the parties concerned, may be beneficially noticed, and occasionally brought forward as an encouragement and stimulus to others. In almost every school there are boys distinguished from their fellows by a tendency towards maturity in their intellectual development. There may be only one or two in a school, or they may amount to half a dozen. They are quiet and studious in their habits, eager for information on various subjects, possessing a natural curiosity which induces them to observe the phenomena of nature, or to engage in the study of some branch of science which happens to excite their interest. Some have a literary turn, and are called bookworms. We knew a boy at school whose hobby was anatomy and surgery. The propensity was not encouraged, and was considered premature, nevertheless he persevered; whenever he could gain access to any books on his favourite subjects, he was absorbed in their contents. Eventually, on leaving school, he studied for the profession, and established himself as a surgeon in Yorkshire. In some establishments, especially public schools, debating societies and elocution classes are formed, and in these juvenile establishments the members imitate their seniors in other places in the mode of conducting business and in the selection of subjects for discussion. University College has its *Monthly Magazine*, and various other periodicals have originated and enjoyed their period of success at similar institutions; and though their fame might scarcely extend beyond the precincts of Alma Mater, yet these undertakings served the good purpose of initiating their conductors and contributors in the art and mystery of writing for press, and in some instances have laid the foundation for literary fame in after life.

Scientific reunions among young men are not very frequent. They sometimes arise out of, or are connected with, associations where science is taught, and where the students form themselves into a club for mutual instruction and improvement according to their own method. It is impossible to place old heads on young shoulders. No suggestions or hints in favour of such mode of association would be of any avail, unless the young men themselves happen to be inoculated with enthusiasm in the right direction. In fact, unless the proposal for such an undertaking originated among the young men themselves, it would be on a precarious and sandy foundation.

The Phytological Club was started in the year 1853, by some of the students

of the School of Pharmacy and Associates of the Society, assisted by two or three Members interested in botany, who considered such an indication of a desire for knowledge worthy of encouragement. It was the object of the Club to promote the study of botany, to establish a communication with members in different localities in the country, to make collections of indigenous plants, and, by the exchange of specimens, to enable each member to obtain as complete a herbarium as possible. It was also intended to collect one herbarium, arranged in the best manner, and containing a complete series of the British indigenous plants, for presentation to the Museum of the Society. Mr. Bentley, the professor of botany, presided over the Club, which met periodically at the house of the Pharmaceutical Society. Some interesting papers have been read, which have appeared in the *Pharmaceutical Journal*, and have been republished in other periodicals. In the year 1857, the Club was designated the Phytological Society, and it was generally supposed to be a successful and flourishing off-set from the parent Society, which would serve to initiate the Students and Associates who joined it in the elements of botanical science, inspire them with a desire for improvement, and prepare them for taking an active part in scientific meetings of a more advanced and important character. We regret to learn that for some time past the loss of some of its originators and most active supporters by death has been severely felt, that it has been found difficult to supply their places, or to keep up a sufficient supply of new members to fill the places of those who retire, in consequence of change of residence, &c. It has also been found difficult to obtain the services of a qualified Curator, who could give up the time requisite for the efficient performance of the duties of such office. Under these circumstances, a circular has lately been sent to the members, informing them of the state of the case, and wishing them to make a renewed effort, in default of which it will be necessary to call a meeting, with a view of deciding as to the course to be taken.

While this fluctuation of fortune was agitating the botanical reunion known as the Phytological Society, a similar association, under the name of the Chemical Discussion Club or Society, has been in process of formation, and application was recently made to the Council for sanction to the holding of its meetings in the rooms of the Society. Some conversation took place respecting the nature of the regulations, and the Council were desirous of being satisfied that the association was being formed on a sound basis, by young men in earnest in what they are undertaking, and thus giving a reasonable ground for hope that the object will be attained, and that the association therefore is likely to be really useful, and a credit to the parent society, under whose auspices it is established. Subject only to such very rational conditions, there is but one view which the Council or the Society at large could take respecting such associations —namely, that every movement of this nature, having reference to the cultivation of those branches of science for the promotion of which the Pharmaceutical Society was established, is a movement in the right direction; that, inasmuch as one volunteer is worth half a dozen pressed men, the formation of such reunions by the Students or Junior Members or Associates is a favourable symptom, and deserving of encouragement. It should, however, be understood, that the formation of such a society involves the responsibility of keeping it up, as the failure of the undertaking would bring discredit on all parties concerned.

THE BRADFORD POISONING CASE—RESULT, AND MORAL.

This case, on the question of manslaughter against the Druggist, has terminated, in the acquittal of the prisoner. The boy Goddard having been, very properly, acquitted by the grand jury, was called as a witness, and his evidence contributed towards the exculpation of his employer. The counsel for the prosecution fairly stated in his opening speech, that to justify a verdict of manslaughter, *gross negligence* must be proved; and it may be gleaned from the

tenor of his observations, and his *pro formâ* mode of going through his duty, that he was not confident of success. The case was fairly and dispassionately argued, and public excitement having in great degree subsided, there was no ground for supposing that any bias existed, tending towards a deviation from strict justice. We shall not call in question the authority of the learned judge, in denying that there was any negligence in the case. *In a legal sense* this is without doubt correct, for negligence, as admitted by the counsel for the prosecution, must be GROSS NEGLIGENCE, to justify a verdict for MANSLAUGHTER. But in a moral or professional point of view, we cannot acquit of the imputation of negligence a man who keeps arsenic and other white powders in the same apartment, without the most clear and distinct labels. No other precaution was required in this instance to have prevented the disaster.

There is one part of the evidence of Goddard which is worthy of remark, as an exemplification of the tendency of disguising poisons. He knew that arsenic, as he sold it in the shop, was coloured. The idea of danger in his mind was associated with the colour of soot or indigo (whichever it happened to be that his master employed for disguising arsenic). It probably never occurred to him that a white powder was likely to be dangerous. The white powder was associated in his mind with flour; he was told it looked like flour; he recognized the resemblance, and was satisfied. The comparative weights (or specific gravity) of the white powders, the shades of colour, the feeling of hardness, softness, or grittiness on rubbing it between the fingers—in fact, none of the sensible characters of these substances had been pointed out to him. The idea of doubt or danger was not in his mind.

Hence we see the folly of the prevailing tendency among amateur legislators against poisoning to aim at security, not by improving the education and intelligence of those who have to deal with poisons, but by adapting the proposed regulations to the capacity of the ignorant and uninitiated, who, under no system of precautions, can safely be trusted with such agents. The physical characters, appearance, and distinctive tests, from which some security might be obtained, even by a moderate amount of knowledge, are to be superseded, and an artificial standard of security is to be invented—a system of signs and symbols, by which it is supposed that a person who can neither read nor write may safely be trusted to fetch and carry, to weigh and sell, the most deadly substances. Thus, arsenic is to be recognized by its black or blue colour (soot or indigo). Poisons in general are to be recognized by the bottle or pot being triangular. Some persons recommend that a bitter ingredient should be mixed with other poisons. In fact, the only real security against accident from poisons—namely, a knowledge of their sensible, tangible, or chemical characters—is to be sacrificed in favour of a disguise which it would be impossible to enforce, and which, when neglected, would cause new sources of danger, more fatal than any which now exist.

SPECULATION IN POISONING AND ADULTERATION.

SOME of the crude and visionary schemes which have been suggested by way of precaution against poisoning, have originated in the speculative propensity of certain clever persons to turn every passing event to good account. The cry of "death in the pot" is lucrative when judiciously applied and well worked. An unfounded imputation (invented, possibly, by a friend in disguise) has sometimes almost made the fortune of a tradesman, by giving him a colourable pretext for informing the public that he sells a first-rate genuine article, which no one had previously taken the trouble to doubt, but which information, duly authenticated by certificates from some of the highest professional authorities who have examined the article, induces many persons to consider for the first time whether it might not be worth

while to try it, and thus the defendant, having been extensively introduced to public notice under the favourable auspices of injured innocence, becomes celebrated and successful, by reason of his masterly refutation of the charges brought against him. It is an undoubted fact, that the rumour about strychnia in beer was the indirect means of greatly increasing the consumption, and adding many thousands per annum to the incomes of the great brewers of India pale ale. There is also good ground for believing that many tradesmen were made or marred, according to the shuffling of the cards, during the crusade of the Analytical Sanitary Commission; some being injured by the publication of unfavourable reports of their stock, while others, by comparison, rose into notoriety and favour with the public.

The agitation in favour of sanitary reform was mainly instrumental in bringing into force an improved system, under which many hundreds of persons are now in receipt of incomes ranging from £50 to £400 per annum or upwards, as inspectors, clerks, medical officers of health, or in other capacities having a sanitary tendency. Without doubt, much of this expenditure is well bestowed, and it has been demonstrated in some instances to have been even a source of economy, besides diminishing the rate of mortality and promoting the comfort of the poor. The fair and sufficient remuneration of persons engaged in the performance of such services for the public benefit is an imperative duty, and one which, in regard to medical and other scientific men, is too often neglected. For example, in coroners' inquests and trials, in which the question which is to decide the verdict turns upon the result of an elaborate *post mortem* examination, or chemical analysis, the just claims of the professional witnesses are sometimes disallowed on some quibble as to "who gave the order?" or "who is liable to pay?" &c. &c., or at best rewarded with the nominal fee of a guinea or two, being the munificent recompense of hours or days of anxious research, and the result of many years of professional experience. Such a disregard of what is due to professional men for public service is not only disgraceful, but calculated to interfere with the ends of justice, by alienating the hearty good-will, and discouraging the energy of a most important class of witnesses. With regard to the adulteration of food or medicine, and casualties with poisons, the general and truthful exposure of cases of fraud, crime, or negligence, has a tendency to promote the interest of the honest and qualified tradesman, by inducing the public to pay some attention to the precept "*caveat emptor*," and to be less eager in the search for articles which are "cheap and nasty." Such is the natural course of events resulting from a straightforward, honest publication of the truth, by means of which the consumer, having his eyes opened, has the opportunity of protecting himself, the dealer regulating his supply by the nature of the demand, is taught to be more careful in the selection of his goods, and the manufacturer must either go with the stream in the direction of improvement, or he will find himself superseded by others less short-sighted, whose experience has taught them that honesty is the best policy.

There is, therefore, a legitimate and fair remuneration due to those who confer a benefit on the public, either by a conscientious discharge of their duties in their respective vocations, or by any extra or casual exertions in the detection and exposure of fraud or crime: but sanitary reformers should be on their guard against the visionary speculations of theoretical projectors, whose fertility of imagination takes the place of practical experience, and who are skilful in contriving large systems of improvement, comprising a numerous staff of paid officers, with a complication of duties involving a corresponding expenditure. Whenever any project of this nature is brought forward, it should be carefully scrutinized, and subjected to the test of public advantage. Such measures do not always originate with the parties who have the responsibility of introducing them. In case of failure, the names of the real authors may probably never transpire; but, in the event of a successful result, they may be expected to appear about the time of filling up the appointments. Sometimes committees

and public boards, or public men, struck with the originality of a suggestion, which in theory seems to be very complete and satisfactory, lend themselves to it, in the honest belief that they are doing service to the public, until the experience of men, conversant with the subject, places the proposition in its true light. Hence the origin of the Poison Bill, and various other sanitary or reformatory measures, which have had an ephemeral existence, and were nipped in the bud.

The Committee of the Manchester and Salford Sanitary Association have had a narrow escape of falling into such a dilemma. A report of this Committee, published in 1847, and recently revived, contains, among a variety of suggestions for the protection of the public health, some proposed regulations relating to poisons, of which we extract the following. (Rules No. 1 to 8 inclusive relate to the keeping of poisons under lock and key, and the registry of sales, as proposed in the original "Sale of Poisons Bill"):—

9. That the Pharmaceutical Chemist, Druggist, or any vendor of medicines shall be bound to adopt the above rules, under a penalty of £ whenever he sells a medicine or drug in such quantity as may prove injurious to health, or act as poison. 10. That in every case where practicable, in which a Pharmaceutical Chemist, Druggist, or other vendor of drugs, shall sell a poisonous substance without the prescription of a duly qualified medical practitioner, he shall be compelled to add to it some substance which, being mixed with it, cannot be separated, and will lead to its detection. For which purpose CARBO-AZOTIC ACID is strongly recommended for arsenic and corrosive sublimate.

11. That Druggists be allowed to sell poisons only by licence, and that the quantities sold at one time be limited. 12. That each Druggist keep a register of the names and addresses of the parties so applying for poisons, and that such register, or a copy of it, be forwarded weekly to the superintendent of police. 13. That a chemical officer be appointed by the corporation, who may be applied to through the police on all occasions of real or suspected poisoning, and in all cases of sudden or suspected death from poison. 14. That a proper officer be appointed, with the authority of Parliament, to carry out these regulations.

At a recent meeting of the Manchester and Salford Sanitary Association, the following propositions were submitted for consideration by way of commencement:—

AS TO FOOD:—1. That no food shall be sold, containing more than one simple substance, unless marked "mixed" or "prepared." 2. That vendors of food be subject to inspection; proper persons being appointed for that purpose by local or other authorities. 3. That false descriptions or adulterations of food shall subject the vendor to a heavy penalty; competent persons being appointed to certify to such adulteration or false description.

AS TO DRUGS:—1. That no person be allowed to sell drugs or medicines after a fixed period, without a certificate of competency; which certificate may be obtained by the present vendors of drugs and medicines on their qualifying themselves within the same given period. 2. That vendors of drugs and medicines be subject to the inspection, under like conditions as the vendors of food.

At the meeting, the injustice and impolicy of the proposed regulations as to drugs were pointed out, and the following carried, by way of amendment:—

1. That no person shall be allowed to sell drugs or medicines without a certificate of competency, with the exception of the present vendors of drugs and medicines. 2. That means be adopted to prevent the sale or dispensing of impure drugs or medicines.

The question as to the means by which these resolutions are to be carried into effect remains an open one; and as the resolutions themselves are little more than abstract propositions, they do not, in the absence of explanation, solve the difficulty of the case.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

AT A MEETING OF THE COUNCIL, 1*st December*, 1858.

Present—Messrs. Bell, Bird, Bottle, Brew, Deane, George Edwards, J. B. Edwards, Hanbury, Hollier, Macfarlan, Meggeson, Morson, Peacock, Squire, Standring, and Waugh, the following were elected

MEMBERS.

DEPTFORD.....Barrs, John Adcock
EDINBURGH.....Noble, Alexander
HARROGATE.....Davis, Richard Hayton
HAMPSTEAD.....Michell, Frederic
KENSINGTON .....Dyson, William Bedford
ROCHDALE.....Booth, Henry
WORCESTER..... .....Baylis, Thomas

MAJOR EXAMINATION, 21*st December*.

Chater, Edward Mitchell.....Watford
Clark, John .....Grantham
Griffiths, Alfred William.....London
Paine, Standen.....Brighton
Williams, Thomas Kemble.....Welshpool

MINOR EXAMINATION.

Baldock, John Henry..... .....London
Fowler, Robert John.....Leeds
Richardson, Robert.....Ipswich
Southall, Joseph.....Leeds
Thompson, Charles Henry.....Huddersfield

REGISTERED APPRENTICES.

NAMES.	RESIDING WITH	ADDRESS.
Bedford, Joseph.....	Mr. Bolton...	Dover
Bridges, Charles William...	Mr. Biscoe	London
Holgate, Walter.....	Mr. Barber.....	Liverpool
Picton, John Taylor.....	Messrs. Picton & Hatton...	Warrington
Simpson, Henry David.....	Mr. Simpson.....	Louth
Smith, Hubert.....	Mr. Luff.....	Oxford

PHARMACEUTICAL MEETING.

Wednesday, December 1*st*, 1858.

MR. W. L. BIRD, VICE-PRESIDENT, IN THE CHAIR.

THE following

DONATIONS TO THE LIBRARY AND MUSEUM

were announced:—

Journal of the Photographic Society, from the Society.
Journal of the Society of Arts, from the Society.
Journal of the Linnean Society, from the Society.
Proceedings of the Botanical Society of France, from the Society.
The Quarterly Journal of the Chemical Society, from the Society.
The Quarterly Journal of the Pharmaceutical Society of Victoria, from the Society.
Specimens of sea-weeds, presented by Mr. G. W. Smith, late Secretary.
Specimen of sulphate of copper, presented by Mr. Augustus Bird.
Specimen of bleached olive oil, presented by Mr. C. Whipple.
Wood of Croton Eleuteria, from Mr. Hanbury.
A specimen of the lozenges containing arsenic sold at Bradford, from Mr. F. M. Rimmington.

PREPARATION OF SPERMACETI OINTMENT.

The consideration of the subject introduced by Mr. Giles in a short communication which was read at a meeting on the 6th of October, and reported in the *Pharmaceutical Journal* for November, was resumed on this occasion. Twenty-eight samples of spermaceti ointment, collected by Mr. Giles from different sources, were laid before the meeting, together with a description of these, and some remarks upon the questions involved.*

Dr. Redwood thought the examination to which Mr. Giles had submitted the samples of ointment before the meeting, was too superficial to enable them to form any just conclusion as to the ingredients of the different samples. It was evident that the odour was a very insufficient test, as some gentlemen present came to very different conclusions by this means of testing, from those expressed by Mr. Giles. Of course they all agreed that the instructions of the Pharmacopœia ought to be followed, and that the use of lard was inadmissible, so long as it was not ordered in the Pharmacopœia. The principal point for discussion was, whether bleached olive oil might be used? Some persons considered that bleached oil was inferior in quality, and more liable to become rancid than unbleached oil. He had stated, when the subject was previously discussed, and still continued of the same opinion, that further information, founded upon carefully conducted experiments, was required, and that in the absence of such, they could not satisfactorily decide the question at issue. There were some circumstances which seemed to favour the opinion that the bleaching of the oil did not necessarily increase its tendency to become rancid. The oil prepared for use by watchmakers was always bleached, yet it did not become rancid; if it did, it would be unfit for their use. It was obvious here that the bleaching did not promote rancidity, and although watchmakers' oil was unfit for pharmaceutical use, other sorts of bleached oil were not subject to the same objection. In the process of bleaching, the colouring matter was either precipitated or decomposed. It might be looked upon, therefore, as a purifying process, in which the oil was deprived of foreign matter. When olive oil was bleached, it was not only deprived of its colour, but also of its agreeable taste. It was rendered more purely oily and less agreeable; and although in this state it was decidedly less suited for making salads, it did not follow that its properties, as an application to the skin, were in any degree injured. It might be inferred from analogy that the bleached oil would be less liable to undergo subsequent change than that which was not bleached; just as pure sugar was less liable to undergo change than that which was unpurified. Viewing olive oil simply as a lubricating application for the skin, it was probable that the less it contained of those vegetable principles which gave to it colour and flavour, and which formed no part of the pure oleine, the better it would be suited for such purpose. He considered animal oils better than vegetable oils for such purpose, as they were free from those constituents which gave to the latter more or less of a harsh and drying character. The subject, however, was one requiring further investigation, and he trusted it would not be lost sight of until the doubtful points had been cleared up.

Dr. Edwards was sorry Mr. Giles had relied so much in the examination of the samples of ointment which had been submitted to them, upon the sense of smell, by which, in some cases, he had indicated the presence of tallow, a most unlikely thing to be used. Before undertaking to stigmatize the goods of his neighbours, he should at least have provided himself with some reliable tests. For himself, he did not think there was any other objection to the use of lard than that of its not being ordered in the Pharmacopœia. When properly prepared he considered it to be an unobjectionable substitute for the best olive oil, and he would suggest, that in the preparation of future Pharmacopœias its

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* See *Pharmaceutical Journal* for December, page 335.

claims should be considered. It was the basis of other ointments, and why should it not be contained in this? He did not altogether like bleached olive oil, having formed an opinion that it was liable to become rancid, yet he confessed he could not recollect upon what data this opinion was founded. The oil used by watchmakers was unfit for pharmaceutical use, and was so much altered by the process to which it was submitted, that he thought it needless to refer to it. He should prefer using almond oil to the bleached olive oil, and he knew from experience that this formed a good ointment, which kept well.

Mr. Waugh agreed with the opinion which had been expressed, that further information was required before they could come to any conclusion on the merits of bleached olive oil. He thought, also, that the specimens of ointment on the table were not calculated to throw much light on the subject in reference to the points at issue. They knew nothing of the way in which these ointments were made, or how long they had been kept. A few specimens of ointment made, some with bleached and some with unbleached oil, and others with lard, and all kept under similar circumstances, would have enabled them to form an opinion, but in the absence of some such comparative experiments, they must leave the subject where they found it.

Mr. Pratt thought that lard was very frequently used in making spermaceti ointment, which was a violation of the instructions of the Pharmacopœia.

Mr. Waugh observed, that as long as the Pharmacopœia remained as it was they were bound to follow its directions; but if any better process could be suggested, it might be adopted in a future edition.

Mr. Fincham thought some alteration in the formula was required, as complaints were frequently made of the colour when unbleached oil was used.

Mr. Gale thought the objections urged against bleached olive oil by Mr. Giles were not well founded. He had bleached some olive oil himself, and had prepared spermaceti ointment with the same oil in the unbleached and bleached state, samples of which he now laid before the meeting. He did not consider that the process of bleaching produced any injurious effect upon the oil.

Mr. Fincham said he had used bleached oil for making cold cream, and found that it was necessary, when he did so, to add a larger quantity of perfume than was required when unbleached oil was used.

Mr. Barnes had observed the same effect in using bleached olive oil.

Dr. Redwood referred to the bleaching of castor oil, which was almost universal; but he was not aware that the oil was considered to be in any way injured by the process.

Mr. D. Hanbury said unbleached castor oil was preferred, and, as far as they knew, was always used in their house. They considered that the bleached oil acquired a rancid character sooner than the unbleached.

Mr. Waugh expressed a similar opinion.

Mr. Bottle thought they were more indebted to Mr. Gale for the specimens he had produced, and the history of which he had given, than to Mr. Giles for all the specimens he had collected from his neighbours, of which they knew nothing. It was their duty to endeavour to make their preparations as perfect as possible, and especially to ensure in them uniformity of appearance. When spermaceti ointment was made with unbleached oil it was difficult to maintain perfect uniformity of colour, for not only did the colour of different samples of oil differ, but the ointment when made with coloured oil, if kept for some time, became partially bleached on the surface, so as not to be uniform in colour throughout. He did not agree with Mr. Hanbury that bleached castor oil was more liable to become rancid than the unbleached. He had directed some attention to this subject, and considered that if air was excluded during the exposure of the oil to the light for the purpose of bleaching it, no deterioration of quality ensued. He thought it important that their preparations should be made as sightly as possible, and especially that they should not be subject to changes in appearance. They were all aware of the great objection in this

respect which attached to the *ceratum plumbi compositum* of the London Pharmacopœia, in which unbleached wax was ordered. If bleached wax were used, it would be much more sightly, more uniform in appearance, and certainly not less efficacious.

The Chairman thought the fact of their devoting so much time to the discussion of this subject was a proof of the improvement which had taken place within the last twenty or thirty years, for he could recollect the time when much less attention was given to such considerations.

Mr. Pratt thought the practice of using lard in making spermaceti ointment ought to be condemned by the meeting.

Mr. Cooke considered that there was no other objection to lard than that of its not being ordered in the Pharmacopœia. Before condemning its use, it should be shown that it was inferior to olive oil. He thought the ointment made with lard was quite as good, if not better, than that made with olive oil.

Mr. Barnes differed from Mr. Cooke in the opinion he had formed of the superiority of lard over olive oil.

Mr. Lawrence thought they should condemn any deviation from the instructions of the Pharmacopœia in preparing the ointment if used for dispensing, but when sold to the public in the usual way they were at liberty to prepare it according to the process they considered the best.

Mr. Waugh thought there was nothing before the meeting to call for condemnation. They did not know what was the composition of the samples of ointment sent by Mr. Giles, nor had they sufficient information to enable them to determine whether bleached or unbleached oil or lard formed the best ointment.

ON DECIMAL WEIGHTS.

BY MR. WARDER.

As the adoption of a uniform system of weights for the purposes of the New Pharmacopœia, instead of the two systems now in use in the three existing Pharmacopœias, must cause a change, either partially by the adoption of one of those systems, or wholly by the introduction of a better plan than either, I wish to suggest that a full discussion of the subject in the pages of the *Pharmaceutical Journal*, where the views of the advocates of the different plans may be fully expressed and calmly considered, and if necessary, answered, would be attended with much benefit.

I shall not trespass on your time by dwelling on the inconvenience of the present systems, but proceed at once to detail that plan which I consider the best adapted to the attainment of uniformity and simplicity, without the risk of "creating confusion, doubt, and danger at the dispensing counter."

I propose, then, to take the pound avoirdupois, and divide it decimally, thus—1 lb.=10 ozs.=100 drams=1000 scruples=10,000 grains; or

1 grain
10= 1 scruple
100= 10= 1 dram
1000= 100= 10= 1 oz.
10000=1000=100=10=1 lb.

The advantage of this arrangement for simplicity and ease in calculation is apparent, and its adoption in the laboratory would much facilitate the division and multiplication of the various quantities required for the different preparations. By taking the pound avoirdupois as the standard, the estimate of the cost of the results in the laboratory would be much simplified.

It is desirable that one set of weights should serve for dispensing and compounding as well as for the sale and purchase of drugs. This could be accomplished by a short act of Parliament, declaring the above division of the avoirdupois pound legal under the name of Apothecaries' weight, instead of the

Apothecaries' weight prescribed by the 5th and 6th William IV., ch. 63, by which drugs may be sold. If this were done, and drugs sold by weights decimally divided, it would introduce the system to the public notice, and by practically demonstrating its advantages over any other plan of notation would hasten the adoption of the decimal system for the general use of the community.

This is only a question of time, the decimal division of the coinage is already begun, and when fully carried out with respect to the coin, its application to the weights and measures cannot be long delayed. All the advantages of the decimal division would not be worth considering, if the change would be attended with confusion, doubt, or danger, at the dispensing counter. By the above plan, all danger would be avoided, the grain would be equal to $\frac{7}{10}$ of the grain in present use, and therefore, as it is only likely that mistakes would occur by using the new weight where the old was intended, the effect would be to give two-thirds of the dose prescribed, but even this would be prevented by using another set of signs instead of the present hieroglyphics. Thus :—

For ℥ substitute *o.* ounce
" ℥ " *d.* dram.
" ℈ " *s.* scruple.
" gr. " *m.* minim.

The only change of designation being minim instead of grain, in order to introduce a different sign ; an additional set of small weights so marked would effectually prevent error, as those prescribers who adhered to the old system would use the old signs, and those who adopted the new plan would use the new signs, and the dispenser would use the weights according to the sign.

I have set this plan before you in order to open the question, and in the hope that it may be fairly and fully discussed in the pages of the *Pharmaceutical Journal*, so that after full and fair consideration, a sound conclusion may be arrived at, and the best system adopted.

Dr. Edwards thought the author had been very unscrupulous with drachms and scruples. Nothing was more objectionable than to have weights of the same denomination differing in value. This evil was felt in regard to chemical symbols, but the mischief likely to result would be far greater in the case of weights, and especially of those used in dispensing.

Dr. Redwood said the subject of the weights used in dispensing would have to be considered by the Committee to whom was entrusted the preparation of the National Pharmacopœia. In the Pharmacopœia itself, the best course would probably be to indicate quantities by *parts*, and thus to avoid the use of any denomination of weights.

Mr. Macfarlan thought the use of the term "*parts*" to designate quantities would be quite unobjectionable in the Pharmacopœia. It would be very objectionable, he thought, to introduce a new system of weights expressly for use in medicine.

AT A SPECIAL MEETING OF THE COUNCIL, *December 15th*,

Prsent—Messrs. Bell, Bottle, Brew, Bucklee, Davenport, Deane, Hanbury, Morson, Peacock, Sandford, Squire, and Waugh,

The following letter was read :—

84, *Harley Street, Cavendish Square*, 10*th Dec.*, 1858.

Sir,—The British Pharmacopœia Committee is desirous that the Council of the Pharmaceutical Society should appoint a member to co-operate with the London sub-committee in the preparation of the British (National) Pharmacopœia, and the Committee is desirous that such appointment should be made with as little delay as possible.

I am, Sir, your obedient servant,

A. B. Garrod, *Sec.*

To the President of the Pharmaceutical Society.

After some discussion, it was moved, seconded, and resolved—

"That Mr. Squire be appointed a member to co-operate with the London sub-committee in the preparation of the British Pharmacopœia."

CORRESPONDENCE RELATING TO THE BRITISH PHARMACOPŒIA.

Royal College of Physicians, Dec. 16, 1858.

Sir,—I have the honour to enclose you a copy of resolution passed at the Comitia Majora, held at the Royal College of Physicians, on Saturday, the 11th instant. I have the honour to be, Sir, your obedient servant,

Henry A. Pitman, M.D., *Registrar.*

To the President of the Pharmaceutical Society.

(Copy.)

"Resolved, that the thanks of the College be given to the Society of Apothecaries and to the Pharmaceutical Society, for the valuable assistance afforded by them to the Pharmacopœia Committee of the College."

[The above communication, having been duly acknowledged, terminates the correspondence between the Pharmacopœia Committee of the College of Physicians and that of the Pharmaceutical Society. The former of these Committees is dissolved, having been merged in the London sub-committee of the Medical Council. This, however, is not the case with the Pharmacopœia Committee of the Pharmaceutical Society, which continues in operation.]

Harley Street, Cavendish Square, Dec. 18, 1858.

My dear Sir,—The Pharmacopœia Committee requests the Pharmaceutical Society to continue their Committee and to communicate through their delegate, Mr. Squire, any information on subjects relating to the British Pharmacopœia. One point upon which they are now desirous of obtaining information, is the extent to which the drugs and preparations are employed, as this concerns the List of Materia Medica, which will form the first portion of the work. * *

Believe me, dear Sir, yours very truly,

A. B. Garrod,

Secretary to the Pharmacopœia Committee of the Medical Council.

To Jacob Bell, Esq.

NORTH BRITISH BRANCH, EDINBURGH.

A Meeting of Council was held in 51, George Street, Edinburgh, on 16th Dec., at 11 o'clock A.M. Present—Messrs. Ainslie, Gardner, Kemp, Lindsay, Mackay, Robertson, Tait, and Young. Apologies were read from Mr. Macfarlan and Mr. Raimes.

Mr. Robertson, President, having taken the Chair, the Secretary read a letter which he had received from Professor Christison, as convener of the Sub-Committee of the Committee, to which the General Medical Council of Education and Registration had entrusted the preparation and publication of a National Pharmacopœia, requesting that the Edinburgh Branch of the Pharmaceutical Society would have the goodness to appoint two of its Members to be associated with the existing Pharmacopœia Sub-Committee, and lend their valuable services in assisting to prepare the new Pharmacopœia.

After mature deliberation, it was proposed by Mr. Gardner, seconded by Mr. Lindsay, and unanimously carried, that Messrs. J. F. Macfarlan, 17, North Bridge Street, and James Robertson, present President of the Society here, be appointed representatives of the Pharmaceutical Society at the Board of said Committee; and

It was also further unanimously carried, that the Council should strongly recom-

mend to the Sub-Committee to admit Dr. Douglas Maclagan as representing the Honorary Members of the Society in Scotland.

The Secretary having been instructed to communicate the above resolution to Professor Christison, the meeting separated. JOHN MACKAY, *Secretary.*

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

THE third meeting of the session was held in the Royal Institution on Nov. 25th,

MR. H. S. EVANS IN THE CHAIR.

Messrs. F. Jackson and W. Buckley were elected Members, and Mr. A. Samuels an Associate.

The SECRETARY announced the following donations to the Library and Museum: *How Plants Live and Grow*, by Dr. Asa Gray. *Manual of Botany*, by Dr. Asa Gray, from Mr. Cundell. Specimen of the Prickly Ash Bark (*Xanthoxylum fraxineum*), from Texas, from Mr. H. S. Evans. This is the bark of the "Toothache Tree," much used *per se*, or as tincture for cure of toothache and rheumatic affections, also with advantage in paralysis of the muscles of the mouth. Sample of salts (with analysis), resulting from the evaporation of Cheltenham water, from Mr. D. Duckworth. On the motion of Mr. Abraham, a vote of thanks was unanimously passed to the donors.

Mr. MERCER then delivered a lecture upon "Mineral Pigments." After referring to the importance of the chemistry of painting, and the necessity of the artist knowing the nature and fitness of the colours he employed, if he wished his paintings to resist the effects of time and exposure, he proceeded to a detailed description of the composition and preparation of the more important pigments in general use. White paints were the first dwelt upon; and he stated that though they were very numerous, a good white pigment was still a desideratum. The manufacture of oxide of zinc had of late years been much improved, and was now largely used instead of white lead. The formation of the beautiful cobalt blue was shown by experiment, and the manufacture of ultramarine explained. Ultramarine was largely used by the pastrycooks for colouring confectionary, and though less hurtful than many of the other colours, they would persist in using, its use was still to be deprecated, unless specially prepared for the purpose. Sulphide of hydrogen was freely liberated from ultramarine by a weak acid, and this liberation no doubt takes place readily in the stomach when any confectionary coloured by this substance was partaken of. This decomposition could be prevented by first digesting the ultramarine in weak acetic acid, and well washing with hot water; but he did not suppose confectioners would take the trouble to see that only such ultramarine was used, for it was a most extraordinary fact that, though the poisonous nature of a large number of the pigments they employ had been over and over again pointed out, they persisted in using them. Yellow ochre, the commonest colour we have, had always been much prized by artists, from its being extremely durable, and not subject to change. And this fact was rather surprising when we reflected upon the chemical composition of that pigment—a hydrated oxide of iron—and the tendency there was in the lower oxides of iron to change. In ochre this permanence was owing no doubt to the iron being in combination with lime, silica, and alumina; but natural pigments were always more durable than artificial ones. Many of our red colours were obtained from yellow ochre and green copperas, and the process of their manufacture was explained. Vermilion also, and the numerous greens, and other compound colours used in the arts, were dwelt upon, all being illustrated with specimens, or experiments, showing their formation.

The proceedings terminated with a vote of thanks to the lecturer.

Royal Institution.

The fourth meeting of the session was held on the 9th of December,

DR. EDWARDS IN THE CHAIR.

Messrs. D. Costine, J. M. Syers, and R. Syers, were elected Members.

The Secretary announced the following donations:—Two parts of *Muspratt's*

Chemistry, in continuation of former numbers, from Mr. Wright. The *Pharmaceutical Journal*, from the Pharmaceutical Society.

Mr. Mercer exhibited a specimen of purified and bleached rosin, a substance, he said, which at first might not appear to be of much interest or importance, but the bleaching of rosin was a subject which had occupied the attention of the most eminent chemists, and hitherto without success. Now, however, the problem had been solved, and a patent taken out by Messrs. Pochin and Hunt, of Manchester, by which common black rosin, worth only 4*s.* 6*d.* per cwt., was converted into a beautiful white article, worth 18*s.* per cwt. To obtain this result, the rosin to be purified was placed in a still with a receiver, and a steam-pipe in connexion with a boiler was introduced into and reached to the bottom of the still, where it radiated with various smaller pipes, perforated so as to allow of the exit of steam. The steam was heated until the rosin melted, when steam was admitted and thoroughly permeated the entire contents, the temperature of the still being at the same time raised to 600 degrees, at which it was maintained until all the contents of the still capable of being volatilized had passed into the receiver, the contents of which, at the close of the operation, would be found to consist of fluid and solid matter, the former being principally water, and the latter the bleached rosin holding a quantity of moisture in suspension. After the water had been driven off by remelting, the rosin had the beautifully white and transparent appearance of the specimen on the table.

The Chairman remarked that the matter was of great importance, and now that it was accomplished, it was surprising that it had been so long in being discovered.

Mr. Arnott exhibited a small specimen of phosphorated copper, which was exceedingly ductile, and used for the sheathing of ships.

The following lecture was then delivered:—

ON THE BRITISH LICHENS: THEIR CHARACTER AND USES.

BY CUTHBERT COLLINGWOOD, M.B., F.L.S.

No section of the organic kingdom is, perhaps, at first sight so valueless as lichens; nevertheless, the words which that great philosopher, Shakspeare, puts into the mouth of Friar Lawrence* when he goes forth in the morning to cull his simples, are peculiarly applicable to them—

> "For nought so vile that on the earth doth live,
> But to the earth some special good doth give."

For whether we regard them structurally or from a commercial point of view, or even merely æsthetically, as an element of the picturesque in the landscape, they are equally worthy our attention.

Linnæus applied to the mosses the term *servi*, or slaves, and it has been considered by some that this term would have been more applicable to lichens; but *servi* strictly means prisoners of war reduced to slavery (*bello servati*). The title, however, given by the great Swede to the algæ, viz., *vernaculi*, and which signifies slaves born in their master's house, rather expresses the position of the family in question; for where they first spring up, there they live a life of labour as it were, reducing the solid rock to powder, and rendering it fit for higher plants—and there, after vegetating for an almost unlimited period, they die.

The most important uses, therefore, of this tribe of plants—those which are most general in their influence, and which affect the physical conditions of the globe, consist in their capability of producing and disseminating fertile cells, which can find a suitable nidus in situations where no other vegetable production can find food capable of assimilation. For like algæ among vegetables, they possess no true root; and like them also, and entozoa among animals, they derive nourishment from the surrounding fluids. Air and moisture appear to supply them with all the materials necessary for their growth, which is consequently slow and imperceptible. Thus they are able to affix themselves in situations in which no other vegetable could exist. They are the first workers upon newly-exposed rocks—they are also the last organisms met with upon the most elevated Alpine crags, and in the highest Polar latitudes. *Lecidea geographica* is found in both these situations—a grey crustaceous lichen; nevertheless their geographical distribution is not by any means confined to such spots, for the green and coloured foliaceous species attain their maximum development in the regions of the tropics.

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* *Romeo and Juliet*, act ii., scene 3.

It does not appear that there is any rock whose hardness and impenetrability suffice to secure it from their attacks. *Lecidea immersa*, *rimosa*, and *epipolia* prefer calcareous rocks; *Lecidea lucida* and *intricata*, sandstone ; *Lecanora frustulosa* grows upon the Scotch micaceous schists; *Lecidea geographica*, on trap. Many attack granite, as *Lecidea polytropa*, and *Lecanora ventosa; Lecanora tuberculosa* prefers flints; and even quartz in its smoothest form is disintegrated by *Gyrophoras* and *Lecidea geographica.* Many of them secrete an acid (chiefly oxalic) by means of which they corrode the rock, and become inseparable from it.* As a general rule, the crustaceous lichens affect rocks and walls, and foliaceous ones the barks of trees; but this is not universal. Some, however, are only found upon wrought wood ; others affect particular trees ; many grow upon mosses ; and one, *Parmelia hypnorum*, appears to lie quite loosely upon the ground.

If, in the animal or vegetable kingdom, we attempt to form a chain of beings, in which one shall succeed another in regular order, we shall be disappointed; for we shall ever be branching off from the main line, to accommodate forms which will not be bound by any law of a single series. Kingdoms of nature, as well as sub-kingdoms, rather run parallel with one another, than succeed each other. Fungi and algæ are not so much "inferior forms" of vegetation, as parallel series of forms, differing in the main points of their habits and economy, but still both of them alike touching in certain points the class we are considering. Thus some lichens so much resemble fungi in appearance, that they were long passed over as such by botanists, who did not make fungi an especial study. The genus *Bæomyces* (especially *B. roseus*) resembles in odour, texture, and form, a *Helvella.* Acharius long referred *Endocarpon pulchellum* to the genus *Thelephora. Collema spongiosum* used to be mistaken for a *Peziza.* So also *Lecanora pezizoides*, &c. On the other hand, the fam. algæ has its imitators. *Collema pubescens* was long claimed as an alga, and both *Verrucaria submersa* and *Endocarpon miniatum* resemble algæ in their habit. Hence has arisen much misconception, and very erroneous views as to the permanency or otherwise of species and classes, which more enlarged views and increased knowledge have helped to dispel.

Most lichens arrive at perfection in the winter season, and afford much employment to the botanist at that period which is usually looked upon as the *dead season.* Their powers of absorbing moisture also render them more conspicuous in wet weather, when they are sometimes totally changed in appearance and in colour; as *Endocarpon sorediatum*, which thus changes from earthy-brown to olive-green. From a consideration of these facts, we shall not be surprised to find that the largest and handsomest lichens inhabit Alpine regions. The most conspicuous British lichen, *Parmelia glomulifera*, whose thallus is often two or three feet in diameter, as well as the handsome *Parmelia, caperata*, and *conspersa*, and the most splendid cup-lichen, *Scyphophorus bellidiflorus*, whose scarlet apothecia resemble the flower of a double red daisy, are Alpine. So also are the grass-green *Solorina crocea*, and the fimbriated *Usnea florida*, which has a strong claim to be the flowering lichen, just as *Osmunda* is the flowering fern.

There are many obscure points in the history of lichens which require diligent examination ; and although they have attracted a large share of the attention of able inquirers of late years—as Acharius, Swarz, Wohlenberg, Borrer, Schærer, Fries, Fée, Meyer, Wallroth, Montagne, and von Flotow—still there is a wide field in which a student, armed with perseverance and ardour, may add to our knowledge. Many species are extremely ill-defined, and present difficulties of distinction of no ordinary kind. Such are the close affinities of *Verrucaria muralis* and *V. viridula*, as well as those existing among the species of the genus *Scyphophorus*, which Sir J. E. Smith characterizes as one of the most difficult problems in botany. Their peculiar modes of reproduction is not their least remarkable and puzzling character ; and it cannot fail to strike the observer with considerable astonishment, that the shield-like fructification should so frequently be absent. Not only is it very rarely seen in certain species, as *Parmelia sinuosa* and *Borreri*, *Slicta limbata*, &c., but the shields of *Cetraria Juniperina* and *nivalis*, *Cornicularia vulpina*, &c., are absolutely unknown ; and yet these lichens flourish in abundance. No wonder that the theory of spontaneous generation gained strength from these facts, until G. F. Mejer established the fact that lichens were possessed of a layer of cells, which are

* See *Ed. New Phil. Journal*, vol. viii., p. 193.

capable, in the absence of apothecia, and without impregnation, of reproducing the plant. This *gonidic* layer, as it is called, lies immediately beneath the cortex of the thallus, and its isolated green cells are peculiar and characteristic of this class of vegetables; being "intermediate in their function between the vegetative and reproductive cell, assuming the offices, and partaking of the characters of both." According to Schærer,* their reproductive power is even greater than that of the spores. The whole history of the reproduction of the cryptogamia is most remarkable, and taken in connexion with some facts referred to by Schleiden in his last edition of *The Plant*, very significant. It seems as though the whole theory of generation, both of plants and animals, were in a transition state, from the pressure of the facts alluded to, added to those of parthenogenesis, &c.; and awaits the time, when a sufficient collection of facts shall authorize a new generalization.

The author next proceeded to refer to the uses of lichens as *food* and *medicine*. The nutritive properties of lichens chiefly consist of gum and starch—the gum very similar in its character and properties to gum arabic, and the starch of two kinds, viz., lichenin and inuline, the former peculiar to lichens, the second shared by some plants. Lichen starch may be considered intermediate in its properties between ordinary starch and dextrine. It exists largely in Iceland moss (*Cetraria Islandica*), which is consumed to a great extent even in this country, the imports having reached the amount of 20,500 lbs. in a year. It is here, however, used rather as a medicine than as a food. *Gyrophoras* and *Ramalina farinacea* also yield much starch and gum, the latter producing a mucilage almost equal to Iceland moss. Rein-deer moss (*Cladonia rangiferina*), although not eaten in this country, nor indeed by man anywhere, must not be omitted; for in ice-bound regions, where man is dependent upon his domestic animals for everything, those animals find a table spread bounteously for them in the most unpromising situations, where their instinct alone would lead them to search for it.

The medicinal properties of lichens were more valued under the reign of signature medicine than they are at present. Thus, *Cetraria Juniperina*, a very yellow lichen, was long in repute as a useful medicine in jaundice, for no other reason apparently than because of its resemblance to the tint assumed in that disease. So, also, *Sticta pulmonaria*, from the resemblance its thallus bears to the lobes and pits of the lungs, was thought useful in pulmonic disorders. But, as Sir James Smith observes, the signature was not an untrue one, for this lichen possesses, in a marked degree, those mucilaginous and bitter properties which make certain lichens so useful as pectoral medicines. *Peltigera canina* was long in vogue as a specific against hydrophobia; while *P. aphthosa* is still used as a medicine for aphthæ, and *Scyphophorus pyxidatus* for whooping cough. But the common properties of these and many others are the same—viz., their bitter principle and their demulcent character. Some lichens possess them to a more marked extent than others, but both are possessed in an eminent degree by Iceland moss, or *lichen* as it is called *par excellence;* which may, therefore, fairly supersede all others for medicinal purposes, and which in some cases is really a very useful production. The medicinal principles of Iceland moss consist chiefly of two acids—cetraric (C_{34} H_{16} O_{15}), and lichestearic (C_{20} H_{25} O_6), according to Schneidermann and Knop's analysis.

But the properties which render these vegetables most valuable in a commercial point of view, are the dyes which they so abundantly yield. The most important dye-lichens are themselves colourless, and require certain combinations to be effected before they become apparent. Lindsay, indeed, says, that the more showy and brilliantly coloured the thallus, the less probability is there of the lichen being possessed of valuable colouring matters. Thus the scarlet apothecia of *Scyphophori* and the yellow *Parmelia parietina* are valueless as dye-lichens.

The accidental action of ammonia upon lichens has usually been the cause of the discovery of their dyeing properties. Thus lichens are often noticed to be tinged with red in situations where they have been exposed to the urine of wild animals, a fact which always points to their capability of yielding dyes in combination with ammonia; and this is the principle of Helot's test, which consists in digesting the dried and powdered lichens at a temperature of 130° in a solution of ammonia; when, if it is fit for the dyer, it will yield a rich violet-red liquor.

Green, yellow, brown, red, and purple dyes have been obtained; and these are in

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* Schærer, *Enumeratio Critica Lich. Europæ*, p. 16, Bernæ.

the order of their value and application. Green is very rare as a dye, but Lindsay mentions that *Lecanora ventosa* yielded a rich green reaction with ammonia, "a reaction," he adds, "which we found in no other lichen whose colorific capabilities we examined." Among yellow dyes, *Cornicularia flavicans* and *vulpina* afford the chief—in the cortical layer of these it exists in the form of a resinoid principle (vulpinic acid). *Usnea barbata* affords an orange dye in America. The Scottish peasantry have long been in the habit of collecting lichens, which they macerate in tanks of urine, applying their colorific products (chiefly shades of brown) for the dyeing of their stuffs. Among those so used are *Parmelia ceratophylla* and *saxatilis*, and *Sticta pulmonaria*.

Red dyes are yielded by *Ramalina scopulorum*, *R. pollinaria* and *Physcia prunastri*. But the dyes which render this tribe of plants important in a commercial point of view, are derived from a few species which go under the general name of orchils. The chief of these are the species of *Roccella* and *Lecanora*, which yield orchil and cudbear, though fine orchil dyes are yielded by *Umbilicaria vellea* and *pustulata*, *Parmelia perlata*, and some *Urceolarias*. There are, however, four species, which yield the finest dye, *Roccella tinctoria*, and *fuciformis*, and *Lecanora Perella* and *tartarea*. The Roccellæ are maritime in character, and in Britain are confined to the south coasts. About 600 tons are annually imported for the purpose of manufacturing orchil, the best being from the Canaries, averaging £300 per ton, and Azores, £230 per ton; while the Cape weed only fetches £20. The Lecanoræ are not uncommon in Scotland, upon both stones and trees, the *Perella* yielding the best dye. Litmus is principally prepared in Holland (by a secret process) from orchil, by the addition, probably, of potash; and with an infusion of this lichen-blue, as it is termed by Pereira, paper is dipped, and thus prepared for testing.

The author concluded by saying :—Gentlemen, I have read you a page from the book of nature—a volume, which, although of infinite extent, is no "ponderous tome" to repel readers, but rather an illuminated manuscript, delighting and charming the attention by its brilliancy and variety. It is but a page which I have read, a page seldom turned over, rarely referred to, perhaps, because it is not so gorgeously illustrated as are the greater number of its sybilline leaves, but of the text you are now judges, for the matter is a fair specimen of the whole, neither more nor less instructive and interesting. Gentlemen, the volume is open to you all—those that run may read—every one is free to ransack its riches of wisdom ; and if I shall have given any of you an inducement to examine its contents more attentively, I shall be more than repaid by the certain conviction that you will find

> "Tongues in the trees—books in the running brooks—
> Sermons in stones—and good in everything."

(The lecture was illustrated by the author's diagrams, specimens named by the late Sir J. E. Smith, and a set of dye-lichens prepared by Dr. Lindsay, &c. &c.)

The Rev. H. H. Higgins gave some interesting information as to the habitat of a number of rare lichens in the neighbourhood of Liverpool.

A vote of thanks having been passed to Dr. Collingwood, the meeting broke up.

ORIGINAL AND EXTRACTED ARTICLES.

STUDY.

(Third Notice and last.)

(*Concluded from page* 328.)

BY MR. JOSEPH INCE.

Great and manifold are the changes which during the last few years have affected our social system. So strange has been the transformation, that it is difficult to ascertain the cause, unless it be that right feeling has stepped into the place of conventionality. Certainly, however, no other times can boast a better mutual understanding between different classes of society than our own. Charity has become real, and ceased to be official. Were proofs needed in support of this assertion, they would rise spontaneously in embarrassing multiplicity ; and yet amongst them all, none better could be selected than the

bare record of the numerous facilities for intellectual intercourse, for which London is unrivalled.

Some truths are patent to the least intelligent observer. It is an obvious benefit to clothe and instruct the ragged school-boy, and tell him that he is not born for rags; to feed the poor, or serve out hot soup on a cold winter's day; to enter the hovels of the outcast, and win them over to the right and good; to build asylums for the sick and indigent, and to undertake any other plan thoughtful humanity may suggest, in order to keep home happy, and the prison shut. But surely to provide for the mental, moral, and physical condition of a vast army of intelligent young men; to bring knowledge within their grasp; to form their intellectual taste; to offer them the amenities of social intercourse; to save them from the debasing influence of a solitary town life, must be a charity of the noblest order. Let us then be thankful that the special application of this truth has entered into the minds of some earnest and deep-thinking men. To them, and first of all others to Lord Brougham, we owe our Literary Institutions. So undeniable are the advantages they offer, that all classes of young men, from government officials downwards, have enrolled themselves as members, with one remarkable exception — the Chemist and Druggist's Assistant.

Why should this be? To those who centre their happiness in a cigar and a Hansom cab I say nothing; but I should be ashamed so far to underrate the mental character of those engaged in Pharmacy, as to suppose that they were the only individuals to whom self-improvement was an idle song. Let me then act for a moment as guide, philosopher, and friend, and introduce them to a few of our excellent institutions :—

I.—Clapham Literary and Scientific Institution

Contains a good circulating library; books issued every Monday and Thursday evening from 8 to 9 o'clock. The reading-room is open daily from 10 A.M. to 10.30 P.M. Annual subscription to library and lectures, 7*s.* 6*d.*; half-yearly, 4*s.*; members under 17, 5*s.* Annual subscription to library only, 5*s.*; to lectures only, 5*s.* Non-members admitted to any evening lecture on payment of 6*d.*

II.—Greenwich Society.
(In union with the Society of Arts.)

Annual subscription, 10*s.*, or 3*s.* per quarter. Reading room open from 9 A.M. to 10 P.M. Library of 10,000 volumes. Open for circulation of books daily from 9 A.M. to 9 P.M., except on Tuesday evenings, when it is closed at 7 P.M. Lectures and entertainments at 8 o'clock.

III.—Hackney Literary and Scientific Institution,
Manor Rooms, Hackney, N.E.

Has a library of 4000 volumes, for circulation and reference. Reading-room open from 10 A.M. until 10.30 P.M. Lectures are delivered on Wednesday evenings at 8 o'clock, and there are numerous private classes. Non-members are admitted to each lecture on payment of 6*d.* They are more entertaining than strictly useful, on the principle of the old adage, *Dulce est desipere in loco.* Annual subscription, 10*s.*

IV.—Hammersmith Institute.

Annual subscription, 10*s.* Reading-rooms open from 9 A.M. to 10.30 P.M. Library of 1200 volumes, to which 100 volumes from Mudie's have also been added. Classes for various studies. Lectures and entertainments at 8 o'clock. The French class is on Thursday evening. This society has just been reconstituted, having recovered from a late collapse.

V.—Islington Literary and Scientific Society.

A first-class establishment, with reading-room, library, museum, and apparatus. Annual subscription, £2 2*s.* There is a Literary class, Philosophical class, Elocution class, Microscopical, and French class.

VI.—Literary Institution,
165, Aldersgate Street, E.C.

Better known as The Christian Young Men's Society. Open daily from 8.30 A.M till 10.45 P.M. Annual subscription, £1 1*s.*; half-year, 10*s.* 6*d.* This institution was

opened on the 28th of September, 1854, by the Committee of the Young Men's Christian Association, with a view to provide a suitable place of resort for young men after business hours ; and to combine with some elements of domestic comfort, the advantages of respectable and improving society, of a well-selected library, a reading-room supplied with the best periodical literature, and classes for instruction in various branches of learning, conducted by professors of ability and character. The institution contains a library and reference library. Classes are established for English History, Literature, Arithmetic, French, Latin and Greek, German and Elementary English. There is also a Discussion class. Devotional meetings are held on Thursday evenings at 8.30 P.M. Every information may be obtained by applying to Mr. W. Edwyn Shipton, Secretary.

VII.—London Mechanics' Institution,
29, Southampton Buildings, Chancery Lane, W.C.

This was the first institution of the kind established in England, by the late Dr Birkbeck, in 1823. It has called into existence nearly 600 institutions of a similar character in different parts of Great Britain. The library contains upwards of 5000 volumes on history, science, and popular literature, including the most important reviews and periodicals. It is in union with the Society of Arts. Terms:—Annual subscription, £1 1*s.*; half-yearly, 12*s.*; quarterly, 6*s.* The reading-room is open from 9 A.M. till 11 P.M. The evening classes embrace the whole circle of useful studies. The cheapness of the terms may be gathered from the following fees, payable per quarter by non-members :—French, 7*s.* 6*d.*; Latin, 6*s.*; Music from 2*s.* to 3*s.*; Short hand, 5*s.* The lectures are exceedingly well chosen.

VIII.—Lower Norwood Institution.

Lectures every Tuesday at 8 o'clock. The funds are applied to educational and charitable objects.

IX.—Marylebone Literary and Scientific Institution,
17, Edwards Street, Portman Square, W.
President, Jacob Bell, Esq.—Secretary, Mr. John R. Warren.

This institution contains a library of 6000 volumes. The reading-rooms (open from 9 o'clock A.M. till 11 P.M.) are spacious, and abundantly supplied with the morning and evening newspapers, and leading periodicals. Popular lectures are delivered during the season on various subjects. French class, Mons. C. D'Alphonse, Wednesday evening ; German class, Dr. Ehrenbaum, Thursday evening, in addition to instruction in general accomplishments. Annual subscription for gentlemen under twenty-one years of age—also for Assistants and Pupils residing with or recommended by Members, £1 1*s.*

X.—Philosophical Institution,
Beaumont Square, Mile End, E.
(In union with the Society of Arts.)

Annual subscription, £1 1*s.* The reading-room is open from 10 A.M. to 10 P.M. It contains a library for circulation and reference of 8000 volumes, a choral society, a class for Elocution and French. Lectures are given in the various branches of art, science, and literature, besides concerts and entertainments.

XI.—St. Andrew's Lambeth Young Men's Society,
6, Upper Stamford Street, S.

Yearly (minimum) subscription, 7*s.*; half-yearly, 4*s.*; quarterly, 2*s.*, and no extra fees for the classes. As it is self-evident such a scale of payment would not render the society self-supporting, it is earnestly hoped that members will subscribe according to their ability. Every information may be obtained from Mr. James Strachan, at the institution. The reading-rooms are open from 6 A.M. to 10.30 P.M. The library is open from 6 A.M. till 10 P.M. Social meetings are held on the first Tuesdays of the months of January, April, and July. The following is the order for the present season :—Monday, Arithmetic and Book-keeping ; Tuesday, Mutual Improvement class ; Wednesday, French ; Thursday, English Grammar and Composition ; Friday, Theology ; Saturday, Latin and Vocal Music. The classes commence at 8 P.M. and end at 10 o'clock. Every member has the privilege of introducing a friend to the reading-rooms, unless special arrangements are made to the contrary. This society is under the patronage of the Bishop of Winchester.

XII.—St. John's Wood Literary and Scientific Institution,
4, Blenheim Place, Eyre Arms, N.W.

Annual subscription, £1 11*s.* 6*d.*, with privilege to introduce a friend. The reading-room is open from 8.30 A.M. to 10 P.M. The library from 9 A.M. to 8 P.M. The lectures are miscellaneous. Kossuth is occasionally pressed into the service.

XIII.—Walworth Literary and Scientific Institution,
5, Keene's Row, Walworth Road.—Lecture Hall, Lorrimore Road, Carter St., S.

The reading and news rooms are open from 9 A.M. to 10.45 P.M. It has a library and chess room, and the members are invited to lectures and entertainments. There are classes for French, German, Drawing, Elocution, and Vocal Music. Annual subscription, 15*s.*; half-yearly, 7*s.* 6*d.*; quarterly, 5*s.* Lecture-tickets to non-members, 1*s.*

XIV.—Westminster Free Public Library,
Great Smith Street, Westminster, W.

News-room open from 9 A.M. to 10 P.M. The library and reading-rooms open from 10 A.M. to 9.30 P.M. This Institution is supported by, and is intended for the use of, the united parishes of St. Margaret and St. John, Westminster. The library consists of 3800 volumes, including works on Theology, History, Biography, General Literature, and Chemistry, together with a good collection of periodicals, poetry, and novels; also Dictionaries, Encyclopædias, Guides, Catalogues, and books of reference. The news-room is supplied with all the daily morning and evening papers, and several of the weekly papers. The whole of the books have been circulated twelve times during the last twelve months; the daily attendance of visitors averages 141.

In June last a branch library was opened at No. 3, Trevor Square, Knightsbridge, and has been successful. *Both Institutions are entirely free.* It may be recollected that an attempt was made by the Pharmaceutical Society to provide similar accommodation in their own rooms in Bloomsbury Square; the library was thrown open at night, and a librarian was in attendance; there was a bright fire, the usual over liberal allowance of gas, and every possible convenience for study—the plan was subsequently abandoned; the lights were turned out, the door was closed, and the librarian went his way; not because the Council grew weary of well doing, but solely on account of the persevering indifference of the Students.

XV.—Whittington Club, and Metropolitan Athenæum,
37, Arundel Street, Strand, W.C.

Annual subscription, £2 2*s.*; half-yearly, £1 1*s.* Candidates for admission are to be nominated by two members, or to be supported by two satisfactory references. There is a library, reading, and news room. Concerts, lectures, and entertainments are given at stated times. The general programme is as follows:—Monday, Discussion class; Tuesday, Evening Party at 8 o'clock; Wednesday, Music and Italian; Thursday, Lecture; Friday, Dancing, German, and French; Saturday, Elocution. This establishment combines all the features of an institution and a club-house.

I am sorry to be compelled to omit a description of that excellent association called the London Institution, in Finsbury Circus, as its members are all proprietors, without admitting subscribers; in the same way many libraries and institutions have been passed over without a notice, as they are either too expensive, or of too high an order to come within the scope of these observations. I must also offer an apology to the Secretaries of the above-mentioned institutions for having only described their several establishments so far as they are available for the purposes of *evening* study or recreation.

Probably it may have been noticed that some institutions are said to be in union with the Society of Arts. This union was established on May 18, 1852, and has for its principal object that there be an interchange of privileges between the members of different institutions, so that the members of any one institution being temporarily in the neighbourhood of any other, may enjoy at that other, for a limited period, the privileges of admission to its lectures,

library, reading-room, and exhibitions. There are 340 institutions in union. The Council of the Society (John Street, Adelphi) are now engaged in the development of a scheme of general examinations, applicable to the classes at the institutions in union with it. The first annual examination was held in June, 1856.

The Germans have a very sensible proverb which says, "Gute Gesellschaft ist halbe Weg:" Good companionship is half the way—in other words, a dreary walk is shortened considerably by the presence of a cheerful friend. Acting on this advice, many private associations have sprung up in the wake of official establishments. I mention this expressly to demonstrate what young men may do, although their daytime may be laboriously occupied. One instance among many will suffice.

The Carpenter Club.

Established in 1851, in connexion with the City of London School. Annual subscription, £1 1*s*. Life members, £10 10*s*. The objects of the club are twofold: 1st., to keep up friendly intercourse between the old pupils of the school; 2nd, to form a benevolent fund, to assist old pupils or their families by temporary loans or donations of money, or in such other way as may appear practicable. The members dine together twice a year; the surplus funds of the club, and all life subscriptions and donations, are funded, and the dividends arising therefrom are appropriated to objects of benevolence.

Meanwhile the members are zealously bent on self-instruction. Conversaziones are held from time to time at the City of London School, at which lectures are delivered on various topics. Last year the subjects were "Queen Elizabeth and her Times," "Les Causes Célèbres," "Chaucer and his Antecedents," "Life and Times of Milton," "Some peculiar Customs formerly observed in Public Schools."

A few of these adventurous spirits, associated with others (working, be it observed, after business hours), have brought out the *Amateur's Magazine* (published by M. Fryer, 5, Bouverie Street, Fleet Street). Some of its articles are remarkably well written.

Does a fatality rest upon Pharmacy as a profession? Are those engaged in its pursuit of a necessity excluded from either social intercourse, sensible recreation, or energetic study? And yet the stern fact is brought home to us in indubitable statistics, that the Chemist's and Druggist's Assistant is *not* a member of our evening societies, and that, at the present moment, all he can boast of as an association is an Amateur Glee Club..

I envy not the state of mind that does not make the fullest possible allowance for this apparent apathy; five years hence and it will vanish; and if, even in thought, I should have seemed unjust, let me make amends by introducing the student to the most admirable institution of modern times,

The South Kensington Museum.

This Institution has an excellent collection of all objects illustrative of art, including an exhibition of Palissy ware, Majolica, and Fayence—every variety of model adapted for educational purposes—a modern picture and sculpture gallery. The interest of the student will not be diminished on discovering that some of the most exquisite casts are the creation of Fraikin, once an industrious chemist and druggist.

The museum is open every evening from 7 o'clock to 10. Monday, Tuesday, and Saturday, free; Wednesday, Thursday, and Friday, on payment of 6*d*.

A series of lectures, explanatory of the objects and design of the educational division of the museum, is given on Monday evenings at eight o'clock. The last course included the three following subjects:—"The Classification and Geographical Distribution of the Class Mammalia," by Professor Owen; "The Art of Teaching Systematical Botany," by Professor Lindley; and a chemical lecture "On Important Reults by Simple Means," by Professor Hofmann. The lecture theatre holds 450 persons: 300 seats are reserved for schoolmasters, schoolmistresses, and pupil teachers. Fee 6*d*., for the course of six lectures. Tickets for the remaining 150 seats may be obtained for 3*s*. the course, or 6*d*. each lecture. The library is open Monday, Tuesday, and Wednesday, from 10 A.M. till 10 P.M.; Thursday and Friday,

from 10 A.M. till 7 P.M.; Saturday, from 10 A.M. till 4 P.M. Terms 6*d.* per week, or 1*s.* 6*d.* per month.

My task is now accomplished; I have to state facts, and not to argue: it is no longer a question whether the pursuits indicated in this paper have a tendency to divert the mind from more serious things, and to unfit a man for business. The surest way to create an interest in Pharmacy is to awake to an interest for anything; and the lessons in Bloomsbury Square are more likely to be neglected by those who affect the questionable amusements of City life, than by the man whose leisure moments are spent in intellectual cultivation. I commend the subject to the good feeling, the manly intelligence, and the unbiased judgment of every Assistant in London. Experience teaches at least this lesson: let an Assistant be interested in any *one* honourable acquirement, and he will have the sense not to neglect his daily duties; but if he have *no* special object of study and *no* accomplishment, unfortunate is the luckless individual who is either his companion or his master.

31, *Southampton Street*, *Covent Garden*.

INQUIRIES INTO THE FORMATION OF GUM TRAGACANTH.

BY HUGO VON MOHL.

(Translated from the *Botanische Zeitung*, Jahrg. XIV., p. 33, 1857, by Berthold Seemann, Ph.D., F.L.S., with corrections by the Author.)

An inquiry into the nature of gum tragacanth is not without theoretical interest, as it is connected with some difficult points of anatomy and physiology, which have not yet been sufficiently explained.

Tournefort (*Relation d'un Voyage du Levant*, Amsterd., 1718, I. 22) was the first to whom we are indebted for closer observations on the exudation of gum tragacanth. His observations were made on Mount Ida, in Crete, and on *Astragalus Creticus*, Lam.* Judging from a figure given by him (p. 21), the stem of the plant in question attains about one inch in thickness. The secretion of tragacanth in the form of twisted filaments takes place in June and the succeeding months. Tournefort looks upon the gum as the nutritious sap which has become thickened by heat, has burst the vessels, discharged itself in the middle *(dans le cœur)* of the stem and branches as well as in the medullary rays *(dans l'interstice des fibres, les quelles sont disposées en rayon)*, and is then gradually forced out on the surface of the stem, by the sap ascending by the roots, and hardens in the air in the form of worms. He further adds the supposition that the contraction of the fibres of the stem assists the forcing out of the gum, as the hemp-like divided fibres, exposed to the tread of shepherds and horses, draw together in the heat, and favour the excretion of the sap.†

* Sieber (*Reise nach Creta*, ii., p. 68) has, it is true, endeavoured to show Tournefort's statement to be utterly undeserving of credit, as, according to his own (Sieber's) observations, the plant named does not yield any gum tragacanth whatever; but, as not only Tournefort's statement respecting the places in which the stem of the plant produces gum tragacanth, but also that respecting the season of the year in which it is secreted, as well as the aiding of the secretion by wounding the stem, are confirmed a century later by Olivier in Persia, nobody will be misguided by Sieber's contradiction of Tournefort's statement, that the plant alluded to does secrete tragacanth in Crete. If Sieber invokes the testimony of Belon in support of his view, he does so improperly; for Belon (*Observat.*, p. 23) merely says that on Ida no gum is collected.

† We have thought it well to give the quotation from Tournefort at full.—Ed. *Ph. J.*

"* * * Elle donne naturellement de la gomme Adragant sur la fin de Juin, et dans les mois suivants : dans ce temps là, le suc nourricier de cette plante, épaissi par la chaleur, fait crever la pluspart des vaisseaux où il est renfermé : non seulement il s'amasse dans le cœur des tiges et des branches, mais dans l'interstice des fibres, lesquelles sont disposées en rayon, comme il paroît, en la tige [fig.] A: ce suc se coagule en filets, de même que dans les porositez de l'écorce; et ces filets passant au travers de cette partie, sortent peu à peu, à mesure qu'ils sont poussez par le nouveau suc que les racines fournissent: cette matière exposée à l'air s'endurcit et forme ou des grumeaux ou des lames tortues, semblables à des vermisseaux plus ou moins longs, suivant la matière qui se présente: il semble même que la contraction des fibres de cette plante contribue à l'expression de la gomme Adragant: ces fibres déliées comme de la filasse, découvertes et foulées par les pieds des bergers et des chevaux, se racourcissent par la chaleur, et facilitent la sortie du suc extravasé."—*Relation d'un Voyage du Levant*, Paris, 1717, tome i., pp. 55-6.

With these statements agree in many instances those of Olivier (*Reise durch das türkische Reich.* (Germ. transl.), iii., p. 293), who observed the secretion of gum tragacanth from *Astragalus verus* in Persia. In this species also the stem attains an inch and more in thickness, and the gum appears during the time of the greatest summer heat, partly when the influx of sap bursts the bark, partly when the footsteps of animals injure the stem.

Additional confirmation respecting the season in which tragacanth is forced out of the stems, is contained in the statements of Labillardière and Landerer, the first of whom saw the gum in the Lebanon on *Astragalus gummifer*, Labill., during the month of August ; the latter in Greece, on *Astragalus aristatus*, during August and September. The statement that wounding the plant favours the exudation of tragacanth, is likewise confirmed by the custom of making incisions in the plant, prevalent about Bitlis (Ritter's *Erdkunde*, x., p. 689).

As another external condition favouring the secretion of tragacanth, Labillardière (Rozier, *Observations sur la Physique*, &c., 1790, t. xxxvi., p. 48) names the humidity of the air, stating that in the Lebanon, cloudy nights and heavy dews are necessary for the emission of the gum, which only flows abundantly during the night and a short time after sunrise. On this account the shrubs growing in less elevated parts of the Lebanon, and subjected to great heat during the day and a very limited nocturnal humidity, yield but little tragacanth.

These statements obtain a confirmation from the observations made in Greece by Fraas (*Synopsis Plant. Floræ Classicæ*, p. 59), who states that no gum is produced in the mountains of the Peloponnesus by *Astragalus aristatus* and *A. creticus*, nor on Mount Parnassus, nor on the drier mountains generally, whilst there is gum collected in Achaia. He considers the exudation of the gum as dependent upon climatic influences, and ascribes it to the quantity of cold rain alternating with great heat in the mountains of Calaryta, &c.

Labillardière, from the facts observed by him, draws the conclusion that the tragacanth shrub, exposed during the day to the broiling heat of the sun, partakes quickly of the moisture of fogs, and that the gum tragacanth, swollen by the moisture of fogs and dews, forces a passage through the pores of the bark, and appears in the form of twisted worms or drops.

The observations of Labillardière induced De Candolle (*Astragologia*, 1802, p. 12) to explain the manner in which gum tragacanth is forced out in a somewhat different way. He compared the exudation of tragacanth with that of the *Nemaspora crocea* (at that time held to be a mere gum, and not a plant), from the bark of beech-wood, preserved in a moist place. This view he still maintained in his *Physiology* (i., p. 175), after he had acknowledged *Nemaspora* to be an independent plant, having been convinced that the appearance of *Nemaspora* on dead trees stood in connexion with the moisture of the atmosphere, and concluding from this that the influence of moisture caused the wood to expand more than the bark, in consequence of which the former was as if tightly sheathed, and therefore could press mucilaginous substances contained in the inner layers of the bark to the surface. This explanation did not meet with favour from Treviranus (*Physiol.*, ii., p. 21), who assumed that the appearance of the gum originated in an increased secretion of the same.

The above-named botanists entertained not the slightest doubt that gum tragacanth was a mucilaginous sap secreted by the plant ; and the same applies to the pharmacologists, even the most recent, as, for instance, Pereira. Kützing (*Philosoph. Botanik*, i., 203), on the contrary, in consequence of microscopical investigations of the exuded gum, advanced the view that it was an independent organism, a fungus, consisting of cells filled with starch, between which the fibres of the mother plant were placed. The walls of these cells, formed by several thick layers, consisted of bassorine, and were lined with a tender membrane of cellulose. Proofs of the fungoid nature of the cells are looked for in vain. They would not have been superfluous, even if only on account of the great curiosity which a fungus with cellulose membrane and starch granules would present.

An essentially different origin is assigned by Unger (*Anatom. und Physiolog. der Pflanzen*, 119) to gum tragacanth. He states it forms in several species of *Astragalus* the secondary layers of the medullary rays.

Other microscopical investigations of tragacanth, from which something might be learned, are unknown to me. Those of Guibourt (*Hist. Naturelle des Drogues Simples*, 4 édit., tom. iii., 420) are without interest.

In order to obtain an explanation of the nature of gum tragacanth, I considered it above all necessary to examine not only the different kinds of commercial gum, but also the stems of a greater number of *Astragali* of the section *Tragacanthæ*. Unfortunately my materials were so far incomplete, that there were no thick stems at my disposal, the largest being herbarium specimens, about the thickness of a little finger, on the bark of which no exudation of gum tragacanth was visible. The following will show, however, that these materials were, notwithstanding, sufficient to reveal the manner in which the gum is formed.

For the examination of exuded tragacanth, thin, flat pieces of the gum are best suited. A transverse section of such a flat piece macerated in water, shows a considerable number of thick-walled cells lying in an amorphous mucilaginous mass. The walls of these cells are colourless and gelatinous, and consist of thick, partly well-marked layers, resembling in this respect the stratified substance of a starch granule. In the cavity of this cell small starch granules, more or less numerous, are deposited. A closer investigation of these cells requires the application of iodine. This acts but very slowly, whilst an iodized solution of chloride of zinc produces during the first few hours no other alteration than that of colouring the starch granules blue and the walls of the cells pale yellow. It is only after the action of the solution for twenty-four hours or more that the walls of the cells begin to exhibit distinct colours. The inner thin layer of the cells is now found to be of a lively violet colour, and likewise in the thick swollen cell-membrane itself a few thin layers more or less intensely violet-coloured, and separated from each other by thick, uncoloured, gelatinous layers, are apparent. The outer of these coloured layers are often rent, in which case the uncoloured gelatinous substance has partly forced itself through the rents, and become mixed with the mucilaginous substance in which the cells lie imbedded. On account of this partial solution of the outer cell-layers, the size of the cells, the diameter of which is about 0‴.07, cannot be accurately determined, and many of the torn-loose pieces of the cell-layers coloured violet by iodine are irregularly distributed in the amorphous mucilaginous mass.

In vermiform tragacanth the cells were far less perfectly preserved, and the amorphous mucilage in which membranes and starch granules of a paler or darker violet colour were scattered, constituted a relatively larger portion of the entire mass.

Still less frequently occur well-preserved remains of cells in the yellowish nodular tragacanth of Syria, in which moreover the abundance of starch granules is far more considerable, and the granules themselves larger in size and frequently united into compound grains.

After this examination of the tragacanth gum, I proceeded to that of the stems, extending it to those of the following species belonging to the section *Tragacanthæ*, viz.: *Astragalus angustifolius*, Lam., *A. aristatus*, L'Hérit., *A. Anacantha*, M. B.; *A. aureus*, Willd., *A. Barba Jovis*, De Cand., *A. breviflorus*, De Cand., *A. bunophilus*, Boiss., *A. campylanthus*, Boiss., *A. Caucasicus*, M. B., *A. cephalanthus*, De Cand., *A. chromolepis*, Boiss., *A. compactus*, Willd., *A. creticus*, Lam., *A. cyllenius*, Boiss. et Heldr., *A. denudatus*, Stev., *A. echinoides*, L'Hérit., *A. Echinus*, De Cand., *A. erianthus*, Willd., *A. gossyspinus*, Fisch., *A. lagopodiodes*, Vahl., *A. leiocladus*, Boiss., *A. massiliensis*, Linn., *A. microphysa*, Boiss., *A. murinus*, Boiss., *A. Persicus*, Fisch. et Meg., *A. plumosus*, Willd., *A. Pseudotragacantha*, M. B., *A. ptychophyllus*, Boiss., *A. pycnocephalus*, Fisch., *A. pycnophyllus*, Stev., *A. sciureus*, Boiss., *A. Siculus*, Bir., *A. susianus*, Boiss., and *A. tumidus* Willd. Amongst these there were only four species in the stem of which no tragacanth formation could be discovered, viz., *A. aristatus*, L'Hérit. (from the Pyrenees), *A. massiliensis*, Linn., *A. angustifolius*, Lam., and *A. echinoides*, L'Hérit. In all the others, the formation of gum tragacanth, in a more or less abundance, was apparent.*

The structure of the stems is in general as follows :—The wood consists of thin annual layers, and is extremely tough, easily tearing lengthways into thin filaments. It incloses a thin column of pith [*ein enges Mark*], is crossed by numerous medullary rays, and does not exhibit anything unusual. The same may be said of the bark which contains perfectly formed liber, and is covered by a strong tough periderm.

* The question whether the transformation of the cells into gum tragacanth, to be described below, also takes place in species belonging to other sections of the genus, I have not specially investigated ; but I may remark that I met with the same transformation in two species belonging to the section *Incani*, which I selected at random, viz., *A. brachycarpus*, M. B., and *A. angulosus*, D. C.

But the pith and a great part of the medullary rays are very curious ; for, instead of presenting a thin-walled parenchymatous texture, they appear to the naked eye as a hard, transparent, gum-like mass, which becomes gelatinous in water. There is also often to be found upon the cut surface of the stem a dry projection of gum, which has issued from the interior of the pith.

Aided by the microscope, we perceive at first sight that the gum-like mass which fills the pith cavity [*Markhöhle*], and the medullary rays, or which has issued from the pith in the place where it has been cut, does not consist of dried mucilage [*nicht aus einem eingetrockneten Gummischleim*], but actually of the cells of the pith and medullary rays, which have undergone a more or less complete transformation into gum tragacanth.

Generally this transformation has not occurred to all the cells of the pith and medullary rays ; but, the outer layers of medullary ray, which are nearest to the cells of the wood, consist regularly (and, in like manner, the outer part of the pith, situated nearest to the woody fibres, consist, not unfrequently) of the usual, thin-walled, parenchyme-cells, the membrane of which becomes violet on the application of an iodized solution of chloride of zinc:—These unchanged cells, however, form generally only a very thin stratum, consisting of a few cells, whilst all the remaining cells constituting the central mass of the pith and medullary rays are transformed.

That the peculiar condition of these cells is the effect of a transformation of ordinary parenchyme-cells, and not a condition peculiar to the cells of these parts from the first, is proved by the pith and medullary rays of the tops of branches, which present nothing unusual.

The transformed cells differ in respect to their physical condition from common cellular tissue in presenting a substance, which, when dry, is very hard, transparent, and gummy, and which, when wet, is swollen and slippery. Placed under the microscope these cells (if their transformation has not advanced too far) exhibit the angular form and the close approximation of parenchyme-cells, but their walls are very thick, and evidently composed of numerous very thin strata ; their primary membrane may be exactly distinguished from the secondary incrassating strata [*Verdickungsschichten*], and is not incrassated, as is distinctly seen in a transverse section of the pits in which the primary membrane lies free. The whole form of these cells, the evident stratification of their membrane, the jelly-like softness of the latter when moistened, render them very similar to the well-known cells of the cotyledons of *Schotia*.

In this transition state into gum tragacanth, occur, according to circumstances, partly those cells which border the still unaltered layers, partly also those which form the centre of the pith and the medullary rays, as I observed in the young stems of *Astragalus cyllenius*, Boiss., which plant, according to Orphanides, is one of those from which tragacanth is collected in Greece.

When the transformation has progressed a degree further, the various cells swell in water to a globular form, and become more or less perfectly separated from each other, but still retaining their complete integrity ; while, on the application of iodine, no mucilage is observed issuing from them into the water. In the latter respect I found, however, in some pieces (*Astragalus aureus*, Willd., *A. pseudo-tragacantha*, M. B., *A. compactus*, Willd., *A. pycnocephalus*, Fisch.) a striking exception. There appeared in the water surrounding the cells a mucilaginous substance, which, as it would seem, was soluble in water, and on application of iodized solution of chloride of zinc, instantly assumed a beautiful indigo blue colour. The amorphous contents of the cells as well as those of the unchanged medullary rays and of a part of the cells of the bark, were coloured in like manner. The tint, however, was not lasting, for within a few hours the blue had entirely disappeared, giving place to a yellowish tinge. This phenomenon reminds us again of the cells of the cotyledons of *Schotia*, from which water extracts a mucilage, which is rendered blue by iodine, and is coagulated by alcohol. In other cases, as in *Astragalus cyllenius*, water extracts from the transformed cells a mucilage, which iodine renders yellowish ; but this, like the mucilage that is rendered blue by iodine, is an exception.

When the transformation of the cells into gum tragacanth has advanced further it is impossible to distinguish whether the membranes (which swell up very much in water) are composed of many thin layers or not. This transformation into a mass of homogenous appearance, proceeds in the cell membranes from without to within; for

I observed (in *Astragalus murinus*) cells, in which the change had extended only to the outer half of the walls of the cells, while the inner, by a sharp line separating it from the outer homogenous mass, still showed fine stratification.

Finally, the last transformation into perfectly formed tragacanth takes place when the cells lose their outer solid definition [*Begrenzung*], and these outer layers become merged into a more or less uniform, mucilaginous mass ; in which condition (as is also often the case in exuded gum) the inner layers may still be present in their perfect integrity.

The cells transformed in the manner described, present, at least when moistened, a much greater diameter than the thin walled cells out of which they were formed ; thus one of the larger, unaltered cells of the medullary rays of *Astragalus denudatus* had a diameter of 0‴.0064, whilst a transformed, yet sharply defined cell of the inner part of the same medullary ray, was 0‴.035, that is about five times the size ; in *Astragalus echinus* the size of the transformed medullary cells had increased to 0‴.06, and thus attained about the same size as the cells contained in exuded tragacanth.

The cells are affected by the action of iodine, according to the degree of transformation they have undergone. The unchanged cells of the pith and medullary rays are rendered deep violet in twenty-four hours by the action of an iodized solution of chloride of zinc. The same occurs in the cells which have only been transformed in a slight degree and still possess the form of angular, but thick walled cells of parenchyme. This colouring is, however, not uniform throughout the whole thickness of the walls of the cells, but it is principally the outer and inner layer that is vividly coloured; several thin layers among the secondary strata exhibit also a violet colour. Whether the [apparently] uncoloured strata situated between these two coloured ones were entirely without colour, or were of a very pale violet, I could not make out. A similar condition is often observable in other thick walled parenchyme-cells, which soften and swell up in water, as for instance, in those of *Schotia*.

The more the breaking up of the cells and their transformation into gum tragacanth progresses, the more pale violet does the general body of them become ; while uncoloured, or faintly coloured strata, more and more preponderate over the coloured ones, and the coloured strata, especially the outer, show also a fainter colouring, perhaps only in consequence of their larger mechanical extension.

The observations here detailed will leave no doubt that gum tragacanth is neither a secreted sap, dried by exposure to the air, nor an independent cryptogamic organism ; but that its formation is owing to a more or less complete transformation of the cells of the pith and medullary rays into a gelatinous mass, which, when brought into contact with water, increases in volume to several hundred times the original size of the cells.

Whether the production and exudation of the gum takes place in one and the same place of the stem only once, or whether it is repeated several years, can, of course, only be found out in the native country of the tragacanth plant ; but perhaps the conjecture, that the appearance of the gum continues through a long period of time, is not too bold. The transformation of the pith can of course only take place once in any given part of the stem, and this source will become exhausted after the exudation of the gum formed has sooner or later been effected. It may be different with respect to the medullary rays, as not all medullary rays of a given part of the stem undergo their transformation at the same time. At least in the younger stems examined by me, only a part of the medullary rays had undergone this transformation, while the remainder still exhibited the ordinary structure of thin-walled cells. We may also venture to assume that the great solidity of the peridcrm covering the stcm, is the reason why the forcing of the gum through the bark takes place every year out of a limited portion of the medullary rays, and that consequently, perhaps, many years may elapse before all the medullary rays of a stem have discharged themselves.

Looking around in the vegetable kingdom for analogous transformations of cells into mucilage, we find them to be by no means of rare occurrence. Alexander Braun (*Verjüngung der Pflanze*, p. 203) remarks that, in a manner quite analogous, a softening of the membrane of the cells, their swelling up into a gelatinous form and diffluence [*zerfliessen*], are phenomena of common occurrence in the natural orders *Palmellaceæ* and *Chroococcaceæ*, and that analogous changes in the membranes of the cells are met with in *Hydrodictyon* and *Botrydium*, and that the jelly-like softening of the membrane of the mother cell of pollen granules is connected with the decom-

position afterwards effected. I have also convinced myself that the formation of the abundant intercellular substance of the albumen of several leguminous plants, as *Gleditschia* and *Sophora*, indicates in a manner perfectly analogous the transformation of outer cellular strata into a homogenous jelly, in which, often for a long time afterwards, traces of the primary membrane of the cells can be recognized, until even these entirely disappear. Nor do I doubt that the formation of the intercellular substance of *Fucoideæ*, of *Chondrus crispus*, &c., is indicative of an analogous event. We have consequently, in the formation of gum tragacanth, a special instance of a widely diffused process of disorganization of cellulary membrane, proceeding from exterior to interior, at one time affecting the whole wall of the cells [*die ganze Zellwand*] ; at another, attacking only the outer layers, and ending with their transformation into a more or less soluble jelly. On the other hand, I consider it less appropriate to range, as Unger does, the formation of gum tragacanth, in the same parallel with the formation of secondary and tertiary gelatinous cell-membrane, such as occur in the *testa* of *Cydonia*, *Linum*, *Collomia*, *Ruellia*, &c. ; at least I am not aware that these, before they possess the condition of gelatinous membranes, were previously in the condition of membranes of cellulose.

Tübingen, December, 1856.

MOLECULAR MOTION.

Read before the Bristol Microscopic Society by Mr. G. F. Schacht, of Clifton, Nov. 17th, 1858.

Though at first sight it may appear to others, as it did to myself, that the subject of the movements of small particles when suspended in certain fluids, and the best explanation that can be suggested for such phenomena, is not of sufficient moment to occupy an evening's discussion, I am bold to hope that a little careful thought will prove it to be, not only worthy of our passing attention, but that it allies itself with a group of natural processes of vast importance, whose range of action is scarcely less than universal.

The fact itself is humble enough, and forbids my displaying anything like the beauty of the illustrations that have charmed us at our recent meetings; it is only in the importance of the principles which I think are involved in the *explanation of the fact* that I hope to enlist your interest.

Referring to that generally excellent book, the *Micrographic Dictionary*, I find the following:—

"*Molecular Motion.*—When extremely minute particles of any substance, immersed in water or other liquid, are examined under the microscope, they are seen to be in a state of vivid motion. A little gamboge or Indian ink mixed with water will exhibit the phenomenon distinctly enough. The minute particles or molecules are seen to move irregularly, to the right or left, backwards and forwards, as if repelled by each other, until the attraction of gravitation ultimately overcomes the force upon which their motion depends, when they sink to the surface of the slide."—"This motion is in no way connected with evaporation, for it takes place equally when this is completely prevented just as when it is not. Neither light, electricity, magnetism, nor chemical reagents exert any effect upon it. Heat is the only agent which affects it; this causes the motion to become more rapid. Hence it might be attributed to the various impulses which each particle receives from the radiant heat emitted by those adjacent. Or, as it takes place when the temperature is uniform, may it not arise from the physical repulsion of the molecules, uninterfered with by gravitation, hence free to move? The effect of heat would then be explicable, because this increases the natural repulsion of the particles of matter, as in the conversion of water into vapour.

"Two circumstances appear most favourable for its production and continuance, in addition to the augmentation of temperature—viz., a very finely-divided state of the matter, and the specific gravity of the matter and the liquid in which it is suspended being as nearly as possible coincident."

Now, with a great deal of this I am compelled to differ. The first sentence contains the pith of the error that permeates the whole, and goes far to justify the explanation that follows, and which I think is altogether false. It is far too general. The fact is that *all* solid particles do not exhibit this movement in *all* liquids, nor do the same movable particles show the same amount of motion in various liquids.

The sentence which states that chemicals exert no influence on the movement is, therefore, also erroneous.

In proof of these assertions I adduce the following experiments:—

No. 1. The inky secretion of the sepia consists of a number of black particles, wonderfully minute, suspended in a fluid. A drop of this, largely diluted with water, continues to exhibit this movement for weeks. If, however, weak spirit be used for its dilution it ceases sooner, and, if the proportion of alcohol be considerable, it ceases altogether, and the particles cohere among themselves, refusing to mingle with the liquid.

No. 2. Oil and water have but little affection for each other: if a few drops of the former be rapidly agitated with some water, we obtain a mixture consisting of minutely-divided oil particles distributed in water. They, however, evince a great inclination to reunite into larger globules, and the movement is not either vigorous or of long continuance. Add one drop of alkali, and the division becomes much more complete, and the movement is highly developed.

No. 3. A few drops (the same in each case) of emulsion of gamboge were placed in four different solutions of the same density (1037), viz., A = bicarbonate of potash, B = nitrate of potash, C = chlorate of potash (at this density this solution, C, was saturated), D = tartaric acid. The following results were exhibited:—

A. The gamboge particles were dissolved.
Aa. In a much weaker solution, the movement was equal to, say..... 100
B. The movement was equal to 80
C. " " " 60
D. " " " 40

No. 4. Similar quantities of emulsion of gamboge were mixed with equal portions of two different liquids, one pure water and the other diluted spirit brought to the density of water by the addition of a little sugar. In the spirituous liquor the movement was equal to 100, in the plain water 40.

I think it clear, then, that the chemical relations of the two sets of particles have an important effect upon the resulting movement.

One other experiment I had better, perhaps, record in this place. I succeeded in observing a single particle of oil, suspended in weak potash, far removed from any neighbours, and still noticed the peculiar, tremulous, and uncertain movement in question.

Returning to the article from which I have already quoted, I find the assertion correct which states that two circumstances are found to favour this movement—viz., a finely divided state of the matter, and the specific gravity of the matter and the liquid in which it is suspended being coincident. These are both points of importance.

The declaration that light, electricity, and magnetism produce no effect upon this movement may stand for what it is worth; it is little likely that influences such as these can have anything to do with the real cause.

I do not comprehend what is meant by the words "the physical repulsion of the molecules uninterfered with by gravitation hence free to move," put forth as they are to suggest some explanation beyond and beside the radiant heat hypothesis. I confess my ignorance of *repulsion* existing among the particles of a solid beyond that which is due to the fact of heat, and which becomes sensible and measurable by change of temperature. But on the contrary, I know well of a certain physical *attraction* existing among the particles of every solid, without which, indeed, no solid could exist; and why should this force be supposed suddenly to cease, or rather to be reversed in its direction, by the simple presentation of a liquid? To what is, in my judgment, the true answer to this question I must endeavour gradually to lead you: in the mean time let me suggest it would at least be more rational to suppose that the original force by which the particles were made to cohere was not destroyed, but was temporarily overcome by some more powerful impulse.

So we must leave this mysterious sentence and revert to the consideration of the only tangible assigned explanation, viz., that it is the effect of radiant heat.

Now, if it be the effect of radiant heat, it is clear the minute particles of all solids must be constantly performing these peculiar gymnastics in their dry condition, as well as when mixed with water. There is no special virtue in moisture that has the power of developing the properties of radiant heat; if, therefore, this condition of

force be the true explanation of our curious fact, it must, as I say, be in constant operation in every existing solid.

An hypothesis which supposes such to be the case in the positive atoms of a body which are regarded as never in actual contact, but only in close approximation, is sometimes adopted in explanation of the contraction and expansion of most substances by variations of temperature. Be this theory true or false, the slightest observation convinces us that nothing of the comparatively gross character of these movements occurs in any dry solid; and I repeat it is unreasonable to suppose that the powers of radiant heat should be so developed by the simple presentation of a liquid of the same temperature as to render its effects discernible by a common lens. Let me also recal the experiment I have already read to you, in which a single small particle being observed in the midst of a liquid, was found to be agitated by the same peculiar motion that characterizes similar particles when in numbers. It would be difficult indeed to comprehend how the radiant heat hypothesis could apply to a fact like this.

That augmentation of temperature increases the movement, need be no argument that heat is its cause, for the currents and agitations set up in the liquid itself by any alteration of temperature, would be quite sufficient to interfere with any estimation of the effect of heat upon "molecular motion," if not indeed to account for the increase altogether.

Moreover, the very idea of *radiant* heat involves original difference and subsequent change of temperature ; and, further, force cannot have two manifestations at the same time: if heat produce motion, it ceases to be heat: hence, unless the heat be renewed, the temperature must fall. I need scarcely say there is no evidence whatever of any such loss of temperature.

But there is another effect of heat—the opposite of *repulsion*—that seems to have been strangely overlooked: viz., that it favours that form of *attraction* which so generally exists among particles of dissimilar nature, called affinity.

Perhaps, then, we shall find that, as in morals, when fear that attempts to drive, fails as a motive influence upon the dull atoms of the soul, love irresistible in attractive strength succeeds : so in physics, the real motive influence may be—not repulsion, whose province appears rather to scatter and destroy—but attraction, whose holier mission it is to harmonize and to consolidate ; and, as I hope to show, this view is not simply fanciful, but, in the present case, possesses strong claims to be accepted as the truth.

A few preliminary words on this same force of attraction may perhaps help me to state my argument more clearly. I believe it to be an error to make any essential distinctions between the forms and degrees of this force. We group phenomena under the heads—chemical affinity, solution, adhesion, cohesion, &c., until we come to regard them as distinct, almost as antagonistic powers. A wiser course would perhaps consist in regarding them as limitations of the same force, which begins with the weak cohesion of a lump of chalk, and culminates in true chemical combination. If we rank all within this range as groups of actions, varying only in degrees of development, yet referable to the same original explanation—attraction, a more consistent idea of each would probably be obtained.

Thus, to begin at the lower end of the scale :—A lump of chalk exists as such in virtue of the mutual attraction of its multitude of particles for each other (this form of force, usually termed cohesion, we will for the moment designate the first limitation of the force of attraction), and until a stronger than he shall come, that power of molecular attraction maintains the integrity of the mass. Place it in a jar of water, and lo ! that stronger one appears. The attraction now set up between the particles of the chalk and those of the water, is superior to that existing among the particles of the chalk for each other. Its effect is therefore to break down the mass, and diffuse the chalk particles more or less throughout the liquid. (This manifestation of force, usually called adhesion, we will term the second limitation of the force of attraction.)

To a *small* extent in the case of chalk and water, but to a *considerable* extent in many cases, this attraction of the solid for the liquid does not cease with the mere diffusion of the one in the other, but a more perfect satisfaction of the force occurs, and *solution* takes place.

Leaving then the chalk for a more convenient illustration, we will adopt a lump of sugar. If such be introduced but by one point into the water, the effect of

mutual attraction is primarily to draw up within the substance of the sugar the particles of the water, in opposition to the force of gravity ; secondarily, to break down the mass into atomic particles ; and, finally, to merge the very identity of the solid in that of the liquid, though, at the same time, the resulting syrup is allowed to retain some of the sensible properties of each. (Solution, then, we will consider the third limitation of attraction.)

In true chemical affinity, however, the respective characters of the mutually-attracted atoms are lost, and a compound, having entirely new properties, results ; as when oxygen, a gas, unites with potassium, a metal, to form potash an alkali. (This brings us to the fourth limitation of attractive force, beyond which we need not travel to-night.) I think the gradations of this scale are sufficiently gentle, and the illustrations of the various grades sufficiently analogous, to justify the idea of their being results and modifications of the same force under special limitations.

Under the supposition then that *solution* of *soluble* particles in a liquid, and *suspension* of *insoluble* particles in a liquid are modified examples of the same principles, let us apply the known phenomena of the one to the elucidation of what is doubtful in the other.

If a mass of matter soluble in water be placed in a jar of that fluid and allowed to remain at perfect rest, it is observed, that, in virtue of the attractive actions already explained, the mass disappears in those portions of the water nearest to itself, and the solution thus formed being of greater density than the purer water above, rests for a while at the bottom of the vessel. Gradually, however, this also disappears, for the same impulse which produced the solution continues to operate; each particle of water in the entire jar attracts each particle of the solid, and with so much force, that ultimately gravity is overcome, and the vessel is found to contain a perfectly homogeneous liquid, the solid being equally distributed throughout its entire mass. Thus up to what is termed the point of saturation, at which moment the molecular attractions of the solid particles for each other, and for those of the water, are exactly balanced.

As the result of this action is definite, it is probable the ultimate atoms of both are here brought into mutual association. At this exact moment I can imagine it possible that the whole fluid may be in a state of absolute rest, but under any condition short of this, it must of necessity be disturbed by molecular agitation, analogous to what is observed when the solid particles are insoluble, though now the movement is invisible, from the perfect transparency of the whole.

You will observe we have traced the distribution of a mass of solid particles through a quantity of water without finding the least occasion to refer to the agency of radiant heat.

Now, in the case of *insoluble* solid particles merely *suspended* in water, we have a right to suppose that although the attractive force is limited to the operation of adhesion, the same general character of the impulse holds good, and that an attraction exists between every particle of the solid and every particle of the liquid in which it is suspended, as in the previous illustration. But as the solid particles remain unresolved into their atoms, and in comparatively coarse division, we discern them more or less clearly with our senses, obeying the various impulses by which they are surrounded, and as it were striving to satisfy the attraction which, in the nature of the case can never be satisfied, for however minutely mechanically divided the solid may be, the absolute atoms of the water are infinitely smaller, they cannot, therefore, be all in actual contact with the solid that attracts them—their motive influence must consequently continue, and being also infinitely mobile, the solid particle is drawn about hither and thither, obeying each fresh impulse that its own change of position evokes—striving to satisfy, but never satisfying, or being satisfied—for ever disturbed, and therefore again and again disturbing—in short (as I venture to submit) *producing* the phenomenon whose cause we are seeking.

In these few words, then, I sum up my proposed explanation of molecular motion.

It is due to the operation of the attraction which exists between the particles of a substance diffused throughout a liquid and the particles of the liquid itself—under circumstances which prevent the atomic division of the former, and the consequent satisfaction of that attraction.

Does this explanation coincide with the facts of the case ?

Referring to our experiments, we find that this movement (other things being equal) was greatest and of longest duration when the solid was suspended in a liquid

with which it had some tendencies to combine. My suggested explanation not only meets this fact, but derives the greatest support from it.

Adopting this view, we no longer feel the difficulty that the movement only occurs where the solid particles are in contact with a liquid.

It is in no way inconsistent with the observed effect of fine division, for the more minutely the body is divided the more is it exposed to the attractive influence of the fluid particles.

We can now regard the favourable effect of heat on this movement as we do its ordinary effect upon the process of solution—as it enhances this third limitation of attraction, so, doubtless, it does the second.

And fully also does this hypothesis meet the case of the single particle, whose solitude was found to be no hindrance to its activity. I think also my argument derives some strength from its similitude to the now accepted explanation of the phenomena of endosmose and exosmose, in which the attraction of the fluids for the separating medium is shown to bear so important a part, and which may be regarded as the converse experiment of the fundamental one of to-night, our own being the permeation of a fluid by solid particles, the other the permeation of a solid by fluid particles.

And if true, the preliminary observation, that my subject allies itself with natural processes of almost universal illustration, is nothing strained, for the same influences which control that drop of gamboge-water must be in operation in every pool and pond, lake and ocean, in all their endless varieties of function and appointed work. There would, moreover, be but little difficulty in demonstrating that that great mass of fluid, the atmosphere, and all airs, are subject to actions of like nature.

Our paltry fact, then, properly understood, assumes the exalted proportions of a gigantic agency, which, like all other real truths, loses nothing of its dignity in humbleness of illustration, but asserts its divinity in the fact of being equally immaculate and strong when operating within the narrow limits of a microscopic cell as when amid the myriad waves of the huge Atlantic, or the still mightier sea of vapour that enwraps our globe, it takes its share in that vast work of perpetual renovation which it is at once our delight and our astonishment to trace.

ON THE EQUIVALENTS OF THE SIMPLE BODIES.

BY M. DUMAS.

(*Concluded from page* 236.)

The foregoing facts being admitted, let us take a general survey of the simple bodies, taking the precaution to compare together only those elements which are well known as belonging to the same natural family, as we have done in reference to the organic compound radicals. We will commence with an example which cannot be represented by the terms of a simple progression.

1. This is the case with the group formed by fluorine, chlorine, bromine, and iodine. We have already ascertained that the equivalents of the last three of these bodies are represented by 35.5, 80, and 127; it remains to determine accurately that of fluorine.

I have found that it is equal to 19, as well by the analysis of a natural fluoride of calcium of great purity, as by that of two fluorides of potassium and sodium, prepared with great care, and in large crystals. I will hereafter make known the very simple process by which I was enabled to heat to fusion the sulphates of potash and soda resulting from the decomposition of the fluorides of potassium and sodium with sulphuric acid, without suffering the loss which might be feared from the tendency shown by those two salts to creep up the sides of the crucible, even in operating upon a single gramme of the matter. Now, the four numbers 19, 35.5, 80, and 127, which seem in no way connected with each other, are still related by formulæ similar to those which are presented to us by the three kinds of series or progressions of organic radicals. In representing fluorine by a, the difference between fluorine and chlorine by d, and a complimentary difference which is necessary to pass from chlorine to bromine by d', we find for fluorine, chlorine, bromine and iodine,

$$a$$
$$a + d$$
$$a + 2d + d'$$
$$2a + 2d + 2d'$$

or in numbers,

19 ..... fluorine
19 + 16.5 = 35.5 ..... chlorine
19 + 33. + 28 = 80 ..... bromine
38 + 33 + 56 = 127..... iodine

2. Nitrogen, phosphorus, arsenic, antimony, and bismuth, the respective equivalent of which are represented by 14, 31, 75, 120, and 208, would require the formula

$$a$$
$$a + d$$
$$a + d + d'$$
$$a + d + 2d'$$
$$a + d + 4d'$$

or in numbers,

14 ..... nitrogen
14 + 17 = 31 ..... phosphorus
14 + 17 + 44 = 75 ..... arsenic
14 + 17 + 88 = 119..... antimony
14 + 17 + 176 = 207 ..... bismuth

3. Carbon, boron, silicium, and zirconium have for their equivalents the numbers 6, 11, 21, 33.

I take that of boron at 11, from the analysis of the chloride and bromide of boron just made by M. Deville. That of silicium is taken from the analysis of the chloride of silicium. M. Pelouze had already found that the equivalent of silicium was not so high as Berzelius had made it, and that instead of representing it by 22.2, it should be represented by 21.3. If the native silicates contained as many equivalents of silicium as there are equivalents of carbon in certain organic matters, the correction introduced by M. Pelouze would change many formulæ. I have found, for my part, that this equivalent was between 21 and 21.2. This number, is, however, a maximum, for, notwithstanding all the care taken in purifying the chloride of silicium, I could not remove from it a notable quantity of chloroxycarbonic gas which is held in solution, and the presence of which is easily recognized by the odour which characterizes it, and by the carbonic acid which it disengages in acting on water.

As boron was already represented by 11, silicium by 22, and zirconium by 33, we found the relation of 1, 2, 3, between these three equivalents, and it was admitted also that the equivalent of silicium was the mean of the other two. These relationships disappear when we give silicium its true value.

The numbers 6, 11, 21, and 33, appear to be connected by the following formula:—

$$a$$
$$a + d$$
$$a + 3d$$
$$a + 12d$$

or in numbers,

6..... carbon
6 + 5 = 11..... boron
6 + 15 = 21 ..... silicium
6 + 60 = 66 ..... zirconium

But I have not yet examined whether the equivalent of zirconium should not, in fact, be modified, and I am not certain that its place should be here.

4. I have reserved for the last example, oxygen, sulphur, selenium, and tellurium, the equivalents of which are respectively 8, 16, 40, 64.

That of selenium was fixed at 40 by direct experiments on the formation of the chloride of selenium, which differ considerably in their results from those of Berzelius, probably because I have been enabled to employ purer selenium than he did.

In this group of bodies, the equivalent of the first of them, oxygen, being represented by 8, and the difference between 8 and 16, the first and second terms of the progression being also equal to 8, the values of a and d are the same. We might, therefore, just as well represent them by

$$a$$
$$2\,a$$
$$5\,a$$
$$8\,a$$

as by

$$a$$
$$a + d$$
$$a + 4d$$
$$a + 7d$$

Analogy indicates this latter form as the preferable one, for we could not represent the various bodies comprised within the three preceding series by the single value of a. Hence it appears little probable that the series of oxygen and sulphur escapes the general rule, and it only remains to remark on this subject that $a = d$, that is to say, that the first term of the progression and its ratio are both represented by 8.

We have, therefore,

8 ..... oxygen
8 + 8 = 16 ..... sulphur
8 + 32 = 40 ..... selenium
8 + 56 = 64 ..... tellurium

5. It is also by a difference equal to 8 or to its multiples, that magnesium, calcium, strontium, barium, and lead, are connected together.

$$a$$
$$a + d$$
$$a + 4d$$
$$a + 7d$$
$$2a + 10d$$

12 ..... magnesium
12 + 8 = 20 ..... calcium
12 + 32 = 44 ..... strontium
12 + 56 = 68 ..... barium
24 + 80 = 104 ..... lead

Lithium, sodium, and potassium, are connected with this series, because the value of d is equal in them to 16, that is to say, the double of 8, and we have for these three metals,

$$a$$
$$a + d$$
$$a + 2d$$

7 ..... lithium
7 + 16 = 23 ..... sodium
7 + 32 = 39 ..... potassium

In the radicals of organic chemistry we see in series which are quite dissimilar, such as those which take their origin from methylium and from ammonium, differences of the same value, such as 14 or its multiples. Among the simple substances, properly so called, this circumstance is also remarked, and 8 or its multiples serves equally for the transition, 1st, from oxygen to sulphur, or selenium, or tellurium ; 2ndly, from magnesium to calcium, or strontium, or barium, or lead ; 3rdly, from lithium to sodium, or potassium.

6. These examples are not the only ones. Indeed, I have examined with the greatest care the experiments by which Berzelius determined the equivalent of tin, not only because in a recent work this equivalent has been modified in a strange manner, but especially because I found in it an occasion for showing forcibly the method which I proposed to follow in this investigation.

Every chemist who endeavours to revise an equivalent should be fully convinced that if placed under the same conditions as Berzelius, he would find the same numbers as he did. If it should be otherwise, he must have operated badly, for the numbers given by that great master under the circumstances specified, are always marked by extreme accuracy. Before correcting one of these equivalents, he should discover the cause of error which had been previously neglected. Unless this be done, he had better abstain from the investigation.

With regard to tin, I have treated it in the pure state, as obtained from the liquor of Libavius, with nitric acid in long-necked flasks, made at the glass-works of Plaine de Walsch for my experiments, and much more intractable in the fire than the best Bohemian glass. The stannic acid remaining after the evaporation of the nitric acid, was heated to redness for some hours in the same flask. I had previously balanced the flask exhausted of air, and weighed the tin in vacuo. The stannic acid was also weighed in vacuo. After taking all these precautions, I always arrived at the number 58.8, that is to say, the equivalent of Berzelius.

But, raised to a higher temperature in a platinum crucible, the stannic acid obtained in each of these experiments changed colour, and lost some traces of water which could never be removed by heating the flask. This correction made the equivalent of tin amount to 59.

Whenever I have thought that I could modify the equivalents determined by this great chemist, I have never done so, as will be seen by the table which accompanies this memoir, without being enabled to state the precise reason, and every experimentalist who cannot pretend to a more skilful hand than that of Berzelius himself, will do well to take this course, and to give this guarantee to himself and to others.

The equivalent of tin being fixed at 59, that of titanium which resembles it in so many respects having been fixed at 25, by the well conducted and well devised experiments of M. Pierre, the difference between these two bodies remains equal to 34. Now, between nitrogen and phosphorus, we have found a difference of 17, of which 34 is exactly the double.

The series furnished by titanium, tin, and tantalum, gives, moreover,

26, 59, 92, or 93,

or this difference of 34 is found equally between the first and second terms, and between the second and third.

7. Between chromium and uranium, the equivalents of which have been so judiciously corrected by Peligot, who has fixed them at 26 and 60, there is again a difference of 34.

8. Between molybdenum 48, and tungsten 92, as has been already mentioned, the difference is equal to 44. It is the same number that separates chromium 26, from vanadium 70. If we intercolate these bodies, which would not be at variance with their properties, we should have the progression

26, 48, 70, 92,

the ratio of which is 22.

These examples suffice for demonstrating that the analogies which are revealed between the families of the non-metallic simple bodies, and the families of the radicals of organic chemistry, may also be found in the natural families of the metals.

But before pushing such comparisons further, it is necessary that the equivalents of several metals which have been hitherto determined with some uncertainty, should be revised with care, and their places in a natural order better defined. I am engaged in this work, and shall have the honour of giving an account of it in a second memoir.

The conclusion which I think may be drawn from the results hitherto obtained is favourable to the original view of Dr. Prout, who considered that the equivalents of the different elements known, were all multiples by a whole number of a certain unity ; only, it is necessary, for certain bodies, to refer this unity to an element having a lower weight than that of hydrogen.

It is no less favourable to the opinion which I have long held on the subject of the conformity of constitution which seems to me to exist between the radicals of organic chemistry and those radicals of mineral chemistry which are designated under the name of simple bodies.

It will be readily understood that, on such a subject, I make it a rule to proceed according to the results of experiments, and not to go beyond such results. I am sufficiently well acquainted with the difficulties and perils attending the subject, to induce me to leave to the future the discussion of the unity of matter, which, at the present time, would be premature.

Leaving, then, to these studies their character and their limits, we shall see in them, I hope, a new proof of the close connexion which exists between mineral chemistry and organic chemistry, and an effort, which will not have been useless, for establishing on a solid basis the natural classification of the elements of mineral chemistry.

For, and it is a subject worthy of meditation, when we study the various progressions of which we have established the existence, and defined the principal terms, a general character is always shown in them, whether they be examples furnished by organic chemistry, or those which mineral chemistry furnishes.

It is, that the first body of the series, the starting-point of the ascending progression, determines the chemical character of all the bodies which enter into the series.

Ammonium is reproduced in all its essential qualities by all the compound ammoniums. Methylium gives its form and behaviour to all the radicals of the alcohols and ethers.

The type of fluorine reappears in the same way in chlorine, bromine, and iodine; that of oxygen in sulphur, selenium, and tellurium; that of nitrogen in phosphorus, arsenic, and antimony; that of titanium in tin; that of molybdenum in tungsten, &c. &c.

As if, calling a the first term of the progression, and d its ratio, we were authorized in saying that in every equivalent $a + nd$, it is a which gives the fundamental chemical character and fixes the genus, whilst nd determines only the rank in the progression, and defines the species.

I must here stop. These considerations will acquire more authority when they have been verified by further examples, when I shall lay before the Academy the study of a natural family of which hydrogen is the first term, and will make known the experiments and the approximations which show that the physical properties of the simple bodies are connected with the place which they each occupy in the series of which they form parts.

At present, I conclude from these studies—

1. *That if the equivalents of the simple bodies belonging to the same natural family always constitute a progression by difference in the manner of the equivalents of the radicals of organic chemistry,—the ratio of this progression, often constant, is sometimes replaced, nevertheless, in some of the terms of the progression, by an equivalent ratio, which conceals the simplicity of the law.* *Comptes Rendus.*

NEW SUBMARINE CABLE.

There is nothing which illustrates so forcibly the complete infancy of the science of submarine telegraphy as the important discoveries and improvements which are daily taking place in all that relates to it. Morse's recording telegraph, with its cumbrous modes of signalling, is not long for the present age, and hardly has the printing telegraph been made known ere a code of signals is being arranged which promises to develop to the greatest extent of which it is capable the rapidity of transmitting messages in any language by a few short signals. Most of our readers will recollect the objections which have been urged, on mechanical grounds, over and over again, against the principle of having submarine cables covered with wire in spiral folds. The inconvenience and risks of such a method have been generally admitted—the greatest being the liability of the wire either to become untwisted or form "kinks." A simple arrangement to obviate all these difficulties has now been brought forward in a patent rope by Messrs. Stevenson and Binks, which so adds to the lightness and strength of the cable, and so admirably facilitates the work of submerging, that it appears astonishing why it was never thought of before, especially as its principle of construction has been known for five or six years at least. The improvement simply consists of plaiting the outer covering of wires in a braiding machine, precisely in the same manner with wire as sash-line or picture-cord is with cotton. A plaited submarine cable made on this plan, and closely woven, has its outer covering wound round it with the firmness and almost the closeness of a gun-barrel, while by regulating the size of the wires used an ample degree of flexibility is secured, especially as a rope so made cannot possibly form in kinks, as is the case with those enclosed in the spiral strands. The specimen which has been made consists of twelve plaits, each plait being composed of six galvanized iron wires of No. 15 gauge. The diameter of the whole wire is an inch, its weight is as slight as that of the Atlantic cable, while its cost is very little more, though by the plan of plaiting the wires its breaking strain is increased to no less than 7½ tons. One of the strongest objections which was urged against the Atlantic cable by every engineer of note was the certainty of the outside spiral wires stretching under tension, while the gutta-percha could not. It was contended, therefore, that the effect of any severe strain must break the insulation in minute places, and, of course, expose the conductor to all those electrical derangements which, from some cause or other, we have recently seen the Atlantic cable undergo. None ever attempted to deny that this mechanical defect in the principle of the outer spiral wires was really of the most serious kind, and it was only met by saying that a cable so covered should not be exposed to severe strain of any kind. In a plaited wire, however, the only effect of the strain would be

to compress to the very utmost the inner core and conductor without the least possibility of elongating them.

In the specimen of which we speak, an inch in diameter, the outer wires are plaited so completely round that the section shows them resting as one piece, and thus in the centre, instead of one conductor, ample room is left for four. These are insulated, not by gutta-percha, as has hitherto always been the case, but with india-rubber. This, though electrically speaking, a worse insulator, possesses many peculiar and important advantages, the greatest being that it is totally impermeable to water under any pressure. Of course it would be impossible to coil a submarine cable made with a plaited outer covering, and it would have to be stowed in a vessel in straight lines, running fore and aft. This, however, would be no disadvantage; on the contrary, in many cases it would be decidedly preferable, and the only reason which up to the present time has made it absolutely necessary to coil all submarine cables, is their extreme liability to "kinks" in any other mode of stowage—a liability which even the coiling often fails to overcome. All risk from a foul wire breaking and stripping the cable would be equally done away with on the new principle. In every point of view, therefore, as regards strength, lightness, durability, capacity for carrying several conductors, and freedom from almost all the accidents to which past submarine cables have been exposed, the plaited wire covering is the greatest improvement which has yet been made. Of course, according to the size and strength of the wire required, the number of plaits may be varied from six to twelve, while the size of the wires themselves regulates the amount of flexibility of the whole.—*Times*, Nov. 19.

ACETONE AS AN ANÆSTHETIC.

M. Béchamp states that acetone as an anæsthetic is much less disagreeable than amylene, and its action is more rapid but less durable. It acts upon rabbits in twenty seconds, and its prolonged inspiration does not appear to have any deadly influence on these animals.—*American Journal of Pharmacy.*

THE NEW MEDICAL ACT—ABSTRACT OF PROCEEDINGS.

The First Meeting of the General Council of Medical Education and Registration was held in the Hall of the Royal College of Physicians, London, on the 23rd of November, the Members being—

Dr. Thomas Watson, representing the Royal College of Physicians, London.
Mr. J. Henry Green, the Royal College of Surgeons, England.
Mr. John Nussey, the Apothecaries' Society of London.
Dr. H. W. Acland, the University of Oxford.
Dr. H. J. H. Bond, the University of Cambridge.
Dr. Dennis Embleton, the University of Durham.
Dr. John Storrar, the University of London.
Dr. Alexander Wood, the Royal College of Physicians, Edinburgh.
Dr. Andrew Wood, the Royal College of Surgeons, Edinburgh.
Dr. James Watson, the Faculty of Physicians and Surgeons, Glasgow.
Professor Syme, the Universities of Aberbeen and Edinburgh.
Dr. J. A. Lawrie, the Universities of Glasgow and St. Andrews.
Dr. Aquila Smith, the King and Queen's College of Physicians, Ireland.
Dr. Robert Carlisle Williams, the Royal College of Surgeons, Ireland.
Dr. Charles H. Leet, the Apothecaries' Society of Ireland.
Dr. James Apjohn, the University of Dublin.
Dr. John D. Corrigan, the Queen's University, Ireland.

Sir James Clark, Bart.,
Sir Charles Hastings,
William Lawrence, Esq.,
Mr. Thomas Pridgin Teale,
Professor Robert Christison,
Professor William Stokes,
} Nominated by her Majesty, with advice of Privy Council.

Dr. Thomas Watson was elected Chairman *ad interim*, and Dr. Alexander Wood Secretary *ad interim*. Sir B. Brodie was unanimously elected President

of the Council, on the motion of Dr. Acland, seconded by Dr. Apjohn, and the Committee adjourned from 3.15 to 4 o'clock.

At the Adjourned Meeting, Sir B. Brodie in the chair, Committees were appointed to examine and classify letters, and also to estimate the amount of revenue and expenditure. On the motion of Dr. Christison, seconded by Sir Charles Hastings, the following members were appointed a Preliminary Committee to report and recommend as to a Committee for preparing the National Pharmacopœia:—Dr. Christison, Chairman, Sir James Clark, Dr. Apjohn. A motion was carried respecting the printing of the minutes. Dr. Watson, on behalf of the President of the College of Physicians, stated that the rooms of the College were at the disposal of the Council until they acquired more permanent premises. After a vote of thanks to the College, the interim Chairman and Secretary were appointed to inform the Home Secretary as to the election of Sir B. Brodie as President of the Council. Adjourned till 3 P.M. the 24th of November.

Adjourned Meeting, Nov. 24, Sir James Clark, Bart., in the chair.—The minutes having been read and ordered to be printed, it was resolved—That the minutes of the meetings of the Council should contain resolutions and amendments, with the name of the mover and seconder, but without the discussion.

The report of the Committee on the Pharmacopœia was allowed to take precedence of the other reports, and was read as follows:—

"The Committee beg to suggest, 1st. That the following gentlemen be appointed a Committee to prepare and publish the National Pharmacopœia with all convenient speed:—Dr. Christison, Dr. Thomas Watson, Sir James Clark, Bart., Mr. Green, Dr. Apjohn, Mr. Syme, Dr. Williams, Dr. Andrew Wood, Mr. Nussey, Dr. Leet, with power to add to their number; Dr. Christison to be convener. 2nd. That this Committee shall have full power to communicate with the three Colleges of Physicians, and to request their co-operation in preparing the Pharmacopœia, and to beg them, for that purpose, to appoint Fellows of the several Colleges to be associated with the Committee of the General Medical Council. 3rd. That the Committee shall have powers to communicate with the Pharmaceutical Society, for the same purpose. 4th. That the Committee shall have power to appoint a Chemist or Chemists, to carry on such chemical and pharmaceutical researches as may be found necessary, and to pay these gentlemen such remuneration as the Committee of the General Council may think advisable. 5th. That a sum of £500 be voted by the General Council, from the registration fees of existing practitioners, in order to defray the cost of preparing the Pharmacopœia for printing."

The report was adopted. It was moved by Mr. Lawrence, seconded by Mr. Teale, and resolved—That it be an instruction to the Pharmacopœia Committee that the Pharmacopœia be published in the English language, with the list of the Materia Medica and Compounds in the Latin language.

The report of the Committee on the order of business having been received, it was resolved that the registration fee for those qualified before January 1st, 1859, be £2, and the fee for inserting additional qualifications, 5*s*.; the fee for practitioners after that date being £5. Among other reports, the report of the Committee on letters of application was brought up, including applications for Registrarship, for Clerkship, and miscellaneous.

It was resolved that the offices of Registrar and Treasurer be distinct.

Adjourned Meeting, Nov. 25, Sir B. Brodie in the chair.—It was resolved, in regard to practitioners now practising in the colonies, that registration should not be compulsory at present, but they are admissible until January 1, 1861, on payment of a registration fee of £2, afterwards on payment of £5. That in regard to certain other practitioners, application for instruction is to be made to the Council. That any resolutions of the Council involving additional expense,

shall not apply to medical students who commenced their studies prior to the date of the Act.

The salary of the Registrar was fixed at £500 per annum. Mr. Green moved, and Dr. Williams seconded, Dr. Francis Hawkins.

Dr. Christison moved, and Dr. Laurie seconded, Dr. John Rose Cormack.

Dr. F. Hawkins was elected by a large majority.

[In the course of the discussion on this subject prior to the election, an observation of one of the Members, having been reported out of doors, led to a notice of action for libel.]

It was resolved that the office of Treasurer be honorary, and that two treasurers be appointed; with other regulations relating to cheques and an account in the Bank of England, &c.

Mr. Green and Mr. Nussey were elected Treasurers. After the routine business, the Council adjourned to the 26th November.

After some business relating to returns, fees, and the appointment of clerks and servants, Dr. Christison submitted a series of instructions which he desired should be given to the Pharmacopœia Committee. Agreed to.

Adjourned Meeting, Nov. 27.—On the discussion as to the form of the Register, sections 16, 26, and schedule D, some difference of opinion arose regarding the fourth column in the schedule, which, in the Act, is not filled up. It was moved that the said column be left blank. An amendment was moved to the effect, that the titles be inserted in the fourth column, the title "Physician" denoting Fellows or Licentiates of a College of Physicians, or M.D.'s of Oxford, Cambridge, or London; "Surgeon" denoting Fellows of a College of Surgeons; "Apothecary," Members of the Society of Apothecaries; "Surgeon and Apothecary," those holding the double qualification. Opinions differing, a middle course was adopted, and an amendment carried to the effect that it was inconvenient at that time to fill up the title column in schedule D.

An Executive Committee was appointed, whose duty it should be, among other business, to superintend the publication of the Register. It was resolved that the President or any eight Members of the General Council may summon a special meeting. A resolution was carried relating to the returns of regulations in the different Colleges and bodies as to the courses of study and examination; and a resolution instructing the Executive Committee to prepare and forward to the Lords Commissioners of Her Majesty's Treasury a memorial seeking to relieve the profession from the stamp duty on diplomas. It was resolved that application be made to the Government for apartments for the General Council and Executive Committee; that in the mean time the Registrar be permitted to transact business in his own house; that the Minutes be published 8vo size, and two copies sent to each Member. A vote of thanks to the College of Physicians was passed for the accommodation afforded; also to Mr. Copney, the Secretary, for his services. The General Council adjourned to Wednesday, August 3rd, 1859.

PROCEEDINGS OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

The Seventh Annual Meeting of this Association was held in the city of Washington on Tuesday, Sept. 14, 1858, the proceedings occupying four days.

Delegates from the following Colleges were reported:—Massachusetts College of Pharmacy, New York College of Pharmacy, Philadelphia College of Pharmacy, Maryland College of Pharmacy, Cincinnati College of Pharmacy, Washington Pharmaceutical Association, and St. Louis Pharmaceutical Association.

The preliminary arrangements of the Association having been made, the Chairman, S. S. Garrigues, read the Report of the Executive Committee, from which it appears that the Committee, after the adjournment in 1857, were occupied with the mass of MS. resulting from the proceedings, and after considerable labour, succeeded in arranging them satisfactorily. Twelve hundred copies, of 180 pages each, were

printed. Single copies were distributed to each member free of charge. Copies were also sent to most of the scientific and medical journals, and to some of the English and Continental pharmaceutical journals.

The Committee had not succeeded in obtaining an act of incorporation from Congress, owing to the absence of the Washington member of the Committee during the session of Congress.

The Report having been accepted, the President delivered his annual address.

The following are some of the subjects proposed for investigation in the ensuing year :—

What are the best means of keeping the vegetable extracts, and especially those from narcotic plants, in the dispensing shop, so as to avoid, to the fullest possible extent, the inspissation and alterations to which they are subject, by unavoidable exposure in dispensing ?

Wine of Ipecacuanha. What is the cause of its tendency to deposit a sediment—has that sediment any medical value—and can the deposition be avoided by substituting another alcoholic menstruum of the strength of wine ?

The subject of coating pills with sugar, mucilage, gelatin, and other soluble substances, so as to mask their taste, is becoming of some importance in practical pharmacy. *Question*—What are the best materials for this purpose ; and what the best and most practical process for effecting it, both on a large scale, and extemporaneously ?

What is the value of the phenomena of iridescence in the essential oil of bitter almonds as a test of its purity ?

An essay on the best tests to determine the adulterations of wines and liquors.

It has been shown by repeated trials, that opium or its extract, that has been treated with ether, is much less liable to cause nausea and headache, than when in its normal state. *Question*—What principles besides the odorous matter is thus removed from opium, and upon which of them does the sickening effect depend ?

A synopsis of the History of Pharmacy, and its progress as a science, from the earliest period to the present time.

Oxide of silver, when associated with certain organic matters in pill masses, undergoes decomposition. *Question*—What are the conditions and substances favourable to this change, and how should it be avoided ?

The bark of Larix Europæa has recently attracted some attention in Ireland and England, as an astringent remedy, to allay the chronic discharges from mucous surfaces of the alimentary and urinary organs. *Question*—Does the bark of Larix Americana possess this property, and if so, to what may it be attributed ?

Dr. Garrod, in a paper read before the Royal Medical and Chirurgical Society at London, asserts that liquor potassæ destroys the medicinal power of the alkaloids of belladonna and hyoscyamus. *Question*—Is this assertion corroborated by other investigators, and if so, in what manner does the alkali act?

The subject of improved formulæ for the Fluid Extracts, in reference to their more general adoption in the next Pharmacopœia.

It has been found that Liquor Ferri Iodidi of the Pharmacopœia frequently assumes a brown colour, and that this colour is entirely dissipated on exposure to light, or may be prevented entirely by such exposure to light when first made. (See *Amer. Journ. Pharm.*, vol. xxvii., p. 218. *Question*—To what is this change due, and is it by such change therapeutically affected ?

THE PREPARATION OF SPERMACETI OINTMENT.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

DEAR SIR,—A very few words will prove that *no* person has a right to assume that the use of *bleached* olive oil is an "*open question*" in preparations of the London Pharmacopœia. That work itself refutes the supposition. If any of your readers who have used bleached oil will turn to pages 133-4 of Phillips's Translation, they will there find it written that olive oil is "a *transparent* oil at common temperatures, and *when good* of a *bright*, *light*, *golden* colour, and of a pleasant flavour."

Now I think this is quite sufficient to prove what *kind* of olive oil was intended by the compilers of the Pharmacopœia.

Respectable Chemists ought to discountenance the use of bleached oil in Ung. and Cer. Cetacei, P. L., as it is clearly against the directions, and often causes much unpleasantness to those Chemists who conscientiously follow the Pharmacopœia.

By many, *anything* is used that will produce that "*beautifully white*" preparation that seems so much in favour with the Chemists. I say with the *Chemists*, because I believe, if they consistently followed the Pharmacopœia, and (in cases where necessary) explained to their customers the difference, they would soon abolish this "white"

compound. Cocoa-nut oil and castor oil are very commonly in use. Both these I met with in a neighbouring town not a month since. This being the case, we need not be surprised at Ung. Cetacei becoming *rancid;* whilst made strictly according to the Pharmacopœia, and at as low a temperature as possible, it will keep a very long time, and the *pale yellow* colour may become even more attractive than the "beautifully white" now is. I am, yours respectfully,

Wakefield, Dec. 18, 1858. T. W. Gissing.

[The author appears to confound Phillips's *Translation of the Pharmacopœia* with that work itself.—Ed.]

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—I think this subject is not yet exhausted in your Journal. None of your correspondents have yet alluded to the circumstance of our Pharmacopœia containing *two forms*—viz, first, "*Ceratum Cetacei,*" which is very generally sold for "Spermaceti Ointment;" and, second, the very indefinite form of "*Unguentum Cetacei,*" in which the quantity of olive oil is directed to be "*Octarium,*" "*vel quantum satis sit.*"*

One of your correspondents is indignant at "*the perverted fancy of the public for white spermaceti ointment*"!! but the public know that *spermaceti* is *white*, and therefore they expect its ointment to retain its colour.

I am frequently asked for *white* elder-flower ointment, and for ointment of *green* elder leaves.

I am also asked for *white* spermaceti ointment; and I make it strictly according to the definite form in the Pharmacopœia; but I actually "*pander to the perverted fancy of the public*" (see your last number, p. 338) by using bleached oil.

Sir, your obedient servant,

Birmingham, Friday, Dec. 17. Joseph Leay.

WHITE OR MARBLED CASTILE SOAP ?

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—The colour of officinal soap may be considered by many of our profession to be of very little consequence, but I hope to prove in this communication that it is of some importance to the interests of pharmacy, and in the expectancy of a National Pharmacopœia, in the formation of which the Pharmaceutical Society is requested to take a part, a few remarks even on soap cannot be out of place.

I regret that it is needful to call the attention of the Society to this question, as the following extracts from officinal and other sources show at once to the unprejudiced mind the advantages of white soap over marbled in Pharmaceutical operations; but as all are so apt to follow in their predecessors' footsteps, there is some excuse for the present extensive use of marbled Castile soap. I beg to refer to the report, in this month's *Journal*, of the Pharmaceutical Meeting held on November 3rd, as my apology for introducing this subject; at which meeting I suggested the use of white soap in the preparation of Linimentum Saponis.

To commence with the London Pharmacopœia of 1851, soap is described thus:—

"*Sapo.*—Sapo ex Olivæ Oleo et Sodâ Confectus."

[*Note.*—This cannot be marbled soap.]

In Phillips's Translation of the above Pharmacopœia at p. 390, this remark occurs: "The olive oil soap used in this country principally for medicinal purposes, is made at, and imported, for the most part from Marseilles, under the name of 'Castile soap;' it is met with both white and mottled with red and bluish irregular streaks, the latter of which is usually employed because it 'looks pretty;' the mottling is an intentional *adulteration*, and injures the soap both for medicinal and detergent purposes, so that 'mottled Castile soap' should always be rejected."

Mr. Squire, in his Pharmacopœia, states:—

"*Sapo Durus.*—Hard Soap made of Olive Oil and soda. *White*; it does not stain paper; is free of odour, and dissolves entirely in rectified spirit."

From Pereira's Materia Medica in the article on hard or soda soaps, I extract this passage. "White Castile soap. This is purer than the following variety (viz. marbled), but is a weaker soap (*i. e.* it contains more water)."

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* The object desired is that the ointment shall be of uniform consistence, winter and summer. The cerate is too hard to be substituted for the ointment.—Ed.

To conclude the "extractive" part of this subject, I refer to two papers in the *Pharmaceutical Journal*, one in vol. ii., at page 513, by Mr. Fisher, on Spiritus Rosmarini et Linimentum Saponis, and the other in vol. viii., at page 420, by the late Mr. Hallows, on Linimentum Saponis, both of whom distinctly mention white oil soap as being used in their experiments.

If Linimentum Saponis be prepared with *proof* spirit and marbled Castile soap, a dark brandy coloured solution is formed, as the specimens exhibited by Mr. Deane at the Society's meeting, previously referred to, clearly showed. Now, the popular objection to such a preparation must be obvious to every Pharmaceutist, and especially to those who are favoured with the patronage of the fair sex.

If white soap is weaker than marbled because it contains more water, this objection to its use will be remedied by the drying and powdering process, as recommended by Mr. Deane.

In these days of homœopathic doses of physic, purity of, and the absence of unwelcome though inert substances in Pharmaceutical preparations, are desirable, and it is just possible that marbled soap, with its oxide of iron in pills containing excitable and delicate compounds, may have a decomposing instead of a composing effect.

In the preparation of prescriptions awkward questions and unpleasant consequences might be avoided, if, instead of one house dispensing marbled and another white, both dispensed the latter.

I am, Sir, your very obedient Servant,

177, *Regent Street, Dec.* 16*th*, 1858. WM. JABEZ HALLIDAY.

LIQUID COCHINEAL.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—In four different volumes of your journal I find a formula given for liquid cochineal, which is the one that I (in common, I believe, with almost all Pharmaceutists) have always employed, but, I am bound to confess, with frequent disappointments, owing, as I believe, to the excess of alkali, when equal weights of carbonate of potash, cream of tartar, and alum are used. The production of a purple, rather than a crimson liquid, is the most likely result from following the usual plan ; and of late, as the carbonate of potash has become purer, from the greater care bestowed on its preparation, it has become impossible to make a good article with the ordinary proportions of cream of tartar and alum. Now, the solution already contains so much solid matter in solution as to crystallize with the least reduction of temperature. It would therefore be better to add sulphuric acid drop by drop, until the desired colour is produced, than to increase the quantity of alum. I find that thirty or forty drops of strong sulphuric acid is not more than enough for eight ounces of solution. If this communication is of sufficient importance, its insertion in the Journal would oblige,

Yours faithfully,

31, *Richmond Place, Brighton, Dec.* 13, 1858. EDWARD WOOD.

THE INSURANCE OF CHEMISTS' STOCK AND FIXTURES.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—I beg to call the attention of the Chemists and Druggists, through the medium of this Journal, to the great importance of setting out clearly in their policies of insurance against fire, that which they insure.

I was consulted some time since by a Chemist in the neighbourhood of London, who had been unfortunately burnt out. He was insured in one of the leading offices for £300 ; but, judge his astonishment when on presenting himself with his policy at the office he was told his "*stock in trade was all he could claim*" (that being the term used in the policy), "*the office had nothing to do with the fixtures, glass cases, bottles, &c. &c., but simply with the stock.*

I need not here recapitulate the arguments I used to prove the absurdity of supposing a Chemist would insure his "jalap and rhubarb," and leave uninsured his mahogany drawers, &c. I contended that my client insured his property connected with the trade for £300, and the onus of dissecting that amount lay with the office.

I suspect, however, *the law* was against me, *the policy only speaking of the stock in trade.* I am happy to state that the office did subsequently allow for the glass bottles and trade utensils, but the wood fixtures and fittings it repudiated. I have since seen other policies, and in most "stock in trade and utensils," sometimes "stock in trade and fixtures," but neither is sufficient. It should stand thus:—Stock in trade; trade utensils, including glass cases and bottles ; trade fixtures ; *and the supposed value to each*, so as to form the amount to be insured. "A prudent man forseeth an evil, and guardeth against it when practicable."

I remain, your obedient servant,

Chemical and Medical Agency Offices, BENJAMIN HUMPAGE.
44, *Chancery Lane, London, W.C., 15th December,* 1858.

WINTER ASSIZES.—NORTHERN CIRCUIT.
THE POISONINGS AT BRADFORD.

(*Before Mr. Baron Watson. Tuesday, December* 21*st.*)

CHARLES HODGSON, Druggist, was indicted for the manslaughter of Elizabeth Mary Medgley, at Bradford, on the 30th of October, by negligently selling arsenic, which was manufactured into lozenges, instead of "terra alba" or "daff," *anglicè* plaster of Paris. Mr. Price and Mr. Middleton prosecuted, Mr. Campbell Foster appeared for the prisoner.

Mr. Price, in stating the case, observed that to make it a case of manslaughter by negligence when a person is carrying on his lawful trade, gross negligence must be proved. Having quoted some cases in illustration, he stated the facts of the present case, which were duly proved in evidence, but which it is needless here to recapitulate. The evidence of the boy Goddard, as reported, was clear and straightforward. He did not pretend to any knowledge of drugs or chemicals, having been only a few weeks on trial at the business, uncertain whether he should follow it or not. He described minutely the instructions given by his master, according to which he went to the attic to fetch the powder required, and brought 12lb of it (as he supposed), which he put in two bags and delivered to Neal's man. He had been in the attic before with Mr. Hodgson, who had pointed out some of the things in the room, which was used as a warehouse. He pointed out the barrel as containing arsenic, and told him to be mindful of it. He did not pretend to know daff from arsenic; but he knew that arsenic was poison, and that the arsenic he had to sell in the shop was coloured and labelled. The powder which he weighed was white, "something like flour," which answered to the description given to him : he had no doubt as to its being right. After some cross-examination, Mr. Baron Watson said he really could not see any negligence. When he first read the depositions, he had made up his mind to leave the question of negligence to the court of criminal appeal. Mr. Price called one other witness, namely, the detective officer, who proved the finding of the casks of daff and arsenic in Hodgson's attic, &c. His Lordship said he thought there really was no case for a jury. Mr. Price said, he thought the prisoner ought to have reminded the boy of the arsenic. His Lordship, however, directed the jury to acquit the prisoner. How could it be said there was any negligence here? There must be criminal negligence to convict the prisoner. He did not know that a man could do more, except not keep arsenic. He had warned his young man that the cask contained arsenic, that it was poison, and had directed him to go to another place for the article required. The jury acquitted the prisoner accordingly.

Mr. Price said that great credit was due to the police in preventing the spread of these poisoned lozenges, which had already resulted most lamentably in the death of twenty-one persons.

POISONING BY DOVER'S POWDER.

ON Friday, November 26, an adjourned inquest was held by Mr. Wakley, coroner, respecting the death of Mrs. Hannah Barnett, of 1, Keppel Street, Marlborough Road, Chelsea, who died from the effects of an over-dose of Dover's powder, which was alleged to have been given to her by mistake, as an out-patient of St. George's Hospital.

Mr. Faxon stated, in answer to the coroner, that he had re-weighed and analyzed the two powders found in the room of the deceased ; one of them weighed 16 grains, and the other 32 grains, the former being a portion only of a packet ; they were what was commonly called "Dover's powder." He had obtained from the hospital

the deceased's prescription from which her medicine was made up, which prescription was for compound jalap powders, but there was no jalap in those she had taken. There was a considerable quantity of opium in the powders ; he had found about 5½ grains, and there was not the slightest doubt but that the death was caused by narcotism ; one of the powders contained three ordinary doses.

Mr. Hammerton, the resident apothecary of St. George's Hospital, said he had brought some of the paper commonly used in making up these powders (on comparing it with that which contained the powders found in possession of deceased, it agreed in quality and appearance, even to the water-mark). He could not imagine how such a mistake could possibly occur in his department of the institution, as he believed the assistants to be very careful ; the paper was evidently the same, although the powders, assuming them to have been the proper ones, were just double in quantity to what was ordered in the prescription ; they never kept any in the dispensary in larger packets than from ten to fifteen grains or half a drachm.

The *Coroner* said there was a most culpable neglect somewhere, and that if Mr. Hammerton was aware of any looseness of that character, he hoped these proceedings would have a good effect.

The *Jury* returned a verdict to the effect, "That the deceased took poison by mistake, and that she obtained it at some institution or shop, but there was not sufficient evidence to identify the person or persons who supplied her."

The *Coroner* stated that the case could not be traced clearly to the hospital, or to any person in it, but in consequence of the open verdict, the inquiry could be re-opened, and if at any future time it should be traced, the person inculpated could be sent to Newgate on a charge of manslaughter.

BOOKS RECEIVED.

The Literary and Scientific Register and Almanack for 1859. By J. W. G. Gutch, M.R.C.S.L. London : W. Kent and Co. (late Bogue,) 86, Fleet Street.

This useful Register is considerably enlarged, and the *Tables* have been carefully revised and made more complete. In Photography many new formula have been added.

The Book of Prescriptions, *containing* 3000 *Prescriptions*, collected from the Practice of the most eminent Physicians and Surgeons, English and Foreign, &c. By Henry Beasley. Second edition. London: John Churchill, New Burlington Street. 1859.

A Handbook of Chemical Analysis (adapted to the Unitary Notation.) Based on the fourth edition of Dr. H. Will's *Anleitung zur Chemischen Analyse*. Also Tables of Qualitative Analysis. By F. T. Conington, M.A., F.C.S., &c. London : Longman, Brown, Green, Longmans, and Roberts. 8vo, pp. 290.

Proceedings of the American Pharmaceutical Association, at the Seventh Annual Meeting, held in Washington, D. C., September, 1858, with the Constitution and List of Members. 8vo, pp. 488. Philadelphia : Merrihew and Thompson, Printers.

Familiar Letters on Chemistry, *in its Relations to Physiology, Dietetics, Agriculture, Commerce, and Political Economy*. By Justus Von Liebig. Fourth edition, revised and enlarged. Edited by John Blyth, M.D., &c. London : Walton and Maberly, Upper Gower Street, and Ivy Lane, Paternoster Row. 8vo, pp. 536. 1859. (From the Publishers.)

TO CORRESPONDENTS.

C. B.—When a Chemist has reason to believe that there is a mistake in a prescription, which might cause injury or danger, he should, if possible, communicate with the writer. When this is impossible, he must use his discretion, and, if needful, inform the patient as to the nature of the case, advising him how to act until he sees the doctor again. In case such a prescription were prepared literally with a serious or fatal result the writer would not spare the Chemist; but would say, "He ought to have known it was an oversight." We have, however, known cases in which a supposed error has been an unusually strong dose advisedly prescribed. We have also known discourtesy in a Medical practitioner in such a case recoil upon himself, resulting in an apology to the Chemist, giving him credit for acting to the best of his judgment, and on the safe side.

"*Kappa.*"—One of the parties has been written to, and will without doubt discontinue his illegal practice; the advertisement alluding to the "disgusting pharmaccutist Holloway," cannot be dealt with as an infringement of the law, unless it could be proved that he assumes the title Pharmaceutist himself.

Mr. Bristed (Greenwich) has sent the following notice as a caution to Chemists, and adds that the person described is about twenty-two years of age, and has left in debt to the amount of about £50 to different tradesmen:—"Notice. Greenwich. This is to give notice that Joshua Theodore Sansbury, on Sunday night, December 5th, at 7 o'clock, absconded from the premises of his employer, Mr. John Bristed, chemist and druggist, 11, Nelson Street, Greenwich, to whom he was apprenticed. Any information as to the aforesaid J. T. Sansbury, if forwarded to the above address, will greatly oblige."

An Associate (Birmingham).—(1.) *Caramel*: melt ½lb brown sugar in an iron pot, and apply heat till the liquid acquires a deep brown colour; then add a gallon of boiling water. (2.) The trituration should be continued until the globules of mercury are no longer visible.

An Assistant (Hull).—(1.) *Liquor Ammoniæ Acetatis:* the quantity of ammonia should be sufficient to saturate the acid, so that the solution may be neutral to test paper.

C. (Edinburgh).—True East India Tacamahac is a resinous gum, the produce of *Calophyllum Calaba.*

J. M. (York).—(1.) *The Veterinarian's Vade Mecum.* (2.) Normandy's *Agricultural Chemistry.*

A Subscriber (Callington).—(1.) Hooper's *Medical Dictionary.* (2.) Yes.

T. P. B. (Selby).—Morton's *Veterinary Pharmacy.*

Chemicus (Chester).—We are unable to give the information.

Unguentum Cetacei. An Old Member begs to assure Mr. Giles that he has sold this ointment for 37 years, made without lard or bleached oil; but that when his customers desire it white, he supplies it made with freshly prepared lard.

R. S. (Liverpool).—It is illegal to sell Patent Medicines without the Government stamp.

T. C. H. (Poplar).—It is unlawful to make fireworks in populous districts.

Juvenis (Wolverhampton), *A. Z.*, and *J. P. D.*—*Chloric ether* is usually made by dissolving chloroform in spirit, but it is sometimes prepared by distilling the ingredients for chloroform with spirit. This latter is more soluble in water than the former. Perchloride of carbon, of Turner's *Chemistry*, never has, that we are aware of, been used in medicine; but the name, terchloride of carbon, was, some years ago, erroneously applied to chloroform, and also to chloric ether.

An Inquirer (Kirkcaldy).—*Concentrated lime water* is a solution of lime in a weak solution of sugar. About an ounce and a half of sugar to a pint of water forms a good solvent for lime.

J. (Manchester).—*Boot-top liquid:*—Sour milk, 3 pints; cream of tartar, 2 oz.; oxalic acid, 1 oz.; alum, 1 oz. Mix.

We have to thank Mr. Meyrick for his letter, which we regret not having space to publish. Mr. M. confirms what we are continually pointing out, namely, that disgrace is often brought on the entire Pharmaceutical body by the misdeeds or shortcomings of persons who have no connexion with it, but who, under the name of Chemists and Druggists, carry on a mixed business in their own way. He also suggests that the more general adoption of the title of Pharmaceutical Chemist by the Members would be useful, by keeping in the public mind a clear recollection of the distinction. [We believe this distinction is becoming by degrees very generally understood. We frequently meet with persons who say that, when on their travels, if they want any medicine they always go to a Pharmaceutical Chemist.—Ed.]

Erratum.—Page 255, line 50, *for* Thomson, *read* Thompson.

Instructions from Members and Associates, respecting the transmission of the Journal, before the 25th of the month, to the Secretary, Elias Bremridge, 17, Bloomsbury Square, W.C.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington Street. Other communications to the Editor, 15, Langham Place.

THE PHARMACEUTICAL JOURNAL.

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THE REMUNERATION OF SCIENTIFIC MEN FOR PROFESSIONAL SERVICES.

The excitement occasioned by a mysterious case of sudden death is usually accompanied by a strong enthusiasm on behalf of the *ends of justice*. The criminal, if there be one, must be convicted and punished. But, in the first place, it must be ascertained on medical authority whether the deceased died from other than natural causes, and the coroner orders, if requisite, a post-mortem examination. Supposing the symptoms and appearances to denote the action of poison, the services of a Chemist must be obtained, the contents of the stomach and portions of food or medicine, or any other substance found on the premises, and open to suspicion, must be analyzed. The inquest must be adjourned for the reception of the report, which must be furnished with the least possible delay. At each adjournment of the case the professional witnesses must be in attendance, to answer questions and assist in the inquiry. All other business must give way, as no apology for delay would be received, the ends of justice being at stake; and whether there be only one analysis to be performed, or half a dozen, the orders of the coroner are peremptory, the public anxiously await the issue, and the chemical witness, feeling the weight of the responsibility of life and death resting upon him, must give up his whole time to the investigation until it is completed. His responsibility does not terminate with the presentation of the report to the coroner. He must attend before the magistrates, and probably in court at the trial, where he may be detained several days; and he must be prepared to defend his report, which may be criticized or disparaged by witnesses employed on the other side. If his result should be negative, he may be mortified by hearing insinuations or innuendos, almost amounting to a doubt, as to his professional skill. This slight sketch gives but an imperfect idea of the labour, the responsibility, and the anxiety which rest on a professional man, when called upon to act for and on behalf of the public in the delicate and difficult investigations under consideration.

And how are these services rewarded? The trial is over—the accused is punished or acquitted, as the case may be, public indignation is appeased, the enthusiasm about the ends of justice has cooled down, and the payment of the witnesses is a mere matter of detail or £ *s. d.*, in which no one takes any interest except the parties immediately concerned. The public collectively is not responsible, and individually no inquiry is made, but the excitement of the case being over, it is presumed that the law will take its course, and all just claims will be settled. This, however, depends upon circumstances. There are certain fees allowed by Act of Parliament—for example, a guinea to a medical witness, two guineas for a post-mortem examination, and some discretion in other cases is vested in the coroner, subject, however, to the control of the county magistrates, who may, and not unfrequently do, disallow all charges except such as are specifically defined and authorized by Act of Parliament. Although the coroner may prove that he has paid ten guineas for scientific services essential to the case, which services could not be obtained for a less amount, they (the magistrates) will make him the loser of the difference between the sum paid and the guinea or two sanctioned by the strict letter of the law. Sometimes, therefore, the coroner makes the payment of the scientific witnesses contingent upon the amount being allowed by the magistrates in quarter sessions, the witness being placed in the humiliating position of consenting to return the fee to which he is justly entitled, in case it should be disallowed. The position of the Chemist is still more disadvantageous than that of a medical practitioner, for as a Chemist he has no *locus standi* by Act of Parliament, and is at the mercy of the

coroner or magistrates, who may, in their discretion, make some allowance by way of acknowledgment, but bearing no definite relation to the amount of service performed. It sometimes happens that payment is refused altogether, on account of some informality in the order, or because some other witness has received a fee for similar service, and the law does not provide for payment for a second opinion. A Chemist or toxicologist of the highest standing, who knows by experience what treatment to expect, and who can afford to be independent, can, to some extent, protect himself by insisting on the amount of the fee being settled before he undertakes an analysis; but this is not the case with a rising man, who could scarcely venture to place himself in antagonism with the authorities, the loss of whose future patronage might be still more serious to him than the injustice to which he is obliged to submit as the lesser of two evils.

The state of the law, however, between coroners, medical witnesses, and magistrates is so unsatisfactory, that even when a definite agreement is entered into with regard to terms, this cannot always be enforced, or if enforced it may be at the expense of the individual who happened to be the medium of preliminary negotiation, but whose application for reimbursement is disallowed. The coroner gives the *order*, but he has no power to *ensure payment*—if he guarantees it, it may be to his own loss—he cannot compel the magistrates *to pay* him one farthing beyond the Parliamentary guinea or two guineas.

Some years ago an eminent analytical Chemist made an analysis of two stomachs for poison, giving notice that the fee would be twelve guineas, to which no objection was raised, and the coroner acted on the report, stating that he would lay the matter before the magistrates. They adhered to the strict letter of the law, and ignored the services of the Chemist altogether, and the coroner did not even pay the Parliamentary fee of two guineas, under Wakley's Act, because he had already paid that sum to a surgeon for opening the body! The Chemist to this day has not been paid.

On another occasion the same Chemist, profiting by experience, declined to perform the analysis until a material guarantee was given. The stomachs were sent, and a cheque for ten guineas was paid by the coroner, who, however, on presenting his claim to the magistrates, was only allowed two guineas; the loss of the balance being thrown upon himself.

It is not uncommon to "suck the brains" of a toxicologist, by deputing a medical friend interested in the case to call upon him, and then, upon a difficulty arising as to payment, the mediator being compromised, the report thus artfully obtained and used, professional etiquette intervenes, and the analysis is not paid for. In one instance in which this occurred the coroner was very civil, and promised to do what he could, and to get two guineas allowed if possible, with which promise the transaction terminated.

Some years ago the coroner for Hants sent a stomach for analysis to an eminent toxicologist, who informed him the fee would be six guineas. He paid the amount, but the magistrates disallowed it. In another instance the chief constable of the county gave a written guarantee for the payment of the fee, in a case of murder involving a troublesome investigation, to ascertain whether blood was present on the clothes, knives, tools, &c., belonging to the accused. At the trial the judge allowed a fee for attendance at the assizes, but refused to make any allowance for the preliminary investigation, which the chief constable defrayed out of his own pocket; and the magistrates allowed him to do this, although the investigation was conducted with their cognizance, and was absolutely essential to complete the evidence at the trial. Shabby conduct and shuffling of this kind must materially impede the elucidation of the truth, and thus in proportion prove favourable to the concealment of murder.

The following case is also well authenticated, having occurred some years since:—A servant maid gave up her situation, and returned to the house of her parents: a few days afterwards, she was found dead in bed. An inquest was held, and an inspection of the body was made by order of a coroner. The medical man found the stomach and intestines inflamed, and suspected that the

girl had died from irritant poison. He did not feel competent to make an analysis, but the coroner refused to allow any additional fee; he informed the witness that the post-mortem examination, as well as the analysis of the stomach and intestines, must be made for the "Parliamentary" fee of *two guineas!* It was suggested by the coroner that there was no ground to suspect poison; it was a case of sudden death from natural causes. The medical man properly refused to give any opinion of the cause of death until an analysis had been made. There were one or two adjournments of the inquest, and for a whole week the stomach of this unfortunate girl remained unexamined. It was taken by the medical man to three or four different chemists in London, who refused to make the analysis until a fee of six guineas had been paid or guaranteed—the county in which this occurrence took place being notoriously one in which special fees granted by coroners are disallowed by the magistrates, on the plea that there is "no fund" out of which they can be paid! After the stomach had been thus hawked about London, it was examined by one chemist, and the fee was paid by subscriptions from the clergyman of the parish, the medical man, and some of the principal inhabitants! It was then proved that this *sudden death* was clearly caused by *arsenic*. How many deaths from poison may be concealed under such a system as this.

We have before us the particulars of another case which occurred a few years ago. A man murdered his fellow-servant, a female, and in part burned the body. By order of the coroner and solicitor for the Crown, the clothes of the prisoner were sent to a toxicologist for examination for blood. None, however, was found, with the exception of some very old spots; nevertheless, the Chemist was summoned to the trial, and detained three days, but was not called as a witness, as he could prove nothing. The prisoner was condemned and executed. In his confession he stated that the clothes which had been examined were not worn by him when the murder was committed, but were put on shortly afterwards. The bloody clothes were found in the place which he pointed out. The judge by whom the prisoner was tried allowed the usual expenses for attending at the assizes, but refused to allow anything for the lengthened and elaborate examination of the clothing and furniture, including the search for turpentine and naphtha, which it was supposed the prisoner had used, which investigation occupied several days. When application was made to the court by counsel for the fee for this scientific labour it was positively refused, and the judge alleged, among other reasons, that the results had not assisted the prosecution, as the Chemist had not been called as a witness. A subsequent remonstrance to the judge was disregarded on the plea that the assizes were over and he was "*functus officio;*" but on application to the Treasury, the Secretary of State, some time afterwards, gave an order for payment. The morality of this mode of dealing with the question of remuneration is dangerous in its tendency, for if the witness had reported the presence of blood when there was no blood referable to the case under investigation, he would have materially assisted the prosecution and received his fee without demur. Upon the strength of that evidence, which, as it afterwards appeared, was quite irrelevant, the prisoner, whether innocent or guilty, might have been hanged. The payment of a witness under such circumstances should not be affected in the slightest degree by the result of the investigation. A negative result may, and generally does, occasion much more trouble than a positive one, and when a doubt exists, some moral courage is required in giving the prisoner the benefit of it, especially when there is a general belief that he is guilty. Each link in the chain of evidence should of course be uninfluenced by any such bias, and the doctrine of "no find no pay," is not only unjust to the witness, but exposes him to the temptation of throwing the doubt, if any exist, on the wrong side.

The law being indefinite with regard to the remuneration of witnesses, and some discretionary power being vested in the authorities before whom cases are tried, the practice in the several Courts and in different localities is not uniform;

some adopting a more lenient interpretation, while others adhere to the strict letter of the law, and give only such fees as they find ordered in precise terms in the Act of Parliament. The coroners, we believe, are, as a general rule, more disposed to act liberally than the magistrates, and this is what might be expected, as the preliminary inquiry usually takes place before the coroner, who is obliged to avail himself of any evidence or assistance that may be at command, without regard to expense, to enable him to elicit the facts. The magistrates receive the case in a more mature form, and evidence which might have been essential to the coroner in obtaining a clue to the truth, may to them be less important, on the same principle that the publication of Rarey's horse-taming book for 6*d.* diminished the demand for the secret at the price of ten guineas. This view of the question may serve to explain the propensity which prevails in some quarters to undervalue evidence and services which no longer excite interest, because the time has gone by at which they were considered essential, the same result having subsequently been obtained through other channels.

It is, however, only right to state that in some localities there is a disposition to act fairly and liberally towards professional men engaged in such investigations, and if the same line were generally taken, the grounds of complaint would be greatly diminished. In the counties of Essex and Sussex, for example, we have been informed that the magistrates habitually support their coroners, and act fairly towards scientific witnesses. It cannot, however, be maintained that the state of the law is satisfactory while it arms the authorities with a discretionary power of disallowing entirely or in part the fees for services without which the ends of justice would be defeated, leaving the injured party no other means of redress than the remote contingency arising from an appeal to the Secretary of State. The worst counties for shabby treatment to scientific witnesses, are Surrey and Middlesex, according to the experience of some of our correspondents, who would not undertake a case in either of those counties without a material guarantee or prepayment. Justice also demands a distinct recognition of the claims of a Chemist in his capacity as such, when employed to assist in medico-legal investigations; for, although some of our most able toxicologists and analytical Chemists have been members of the medical profession, and all medical men have a knowledge of chemistry, as a branch of their education, a comparatively small number would be able, without neglecting their regular medical duties, to undertake and perform elaborate chemical analyses. It is therefore the custom in delicate and important investigations to call in a Chemist or professed toxicologist, whose services are equally entitled to remuneration, whether he happens to be a member of the medical profession or not.

In the Bradford poisoning case, which has lately excited so much public attention, some surprise as well as indignation was occasioned by the exposure of the state of the law, which took place on the application of Mr. Rimmington for his fees for the numerous analyses performed by him under the direction of the magistrates. At the Bradford Borough Court, on the 17th January, Mr. Rimmington applied for the balance of his account, amounting to twenty-five guineas. He had received only £5 at York, the whole of his services performed by order of the magistrates being ignored and struck out of the account. He had been required to make eight separate quantitative analyses, besides assisting at a post-mortem examination. He had attended four times to give evidence at Bradford and during a week his entire time had been occupied with this investigation, which had caused him much anxiety as well as labour. Mr. Taylor (surgeon) applied by letter to the Court at the same time, being unable to attend. He claimed two guineas for a post-mortem examination, and a further fee for attendance at the Court-house. He had only been allowed a guinea. In the report of the case, it is remarked that the inadequate remuneration to medical witnesses would cause them to be very careful not to give evidence at York or Wakefield if they could avoid it. Mr. Rand, one of the magistrates, expressed great surprise that such a sum as £5 should have been offered to Mr. Rimmington for his services. He said there

was nothing public men talked more about than their anxiety to check crime, but if this scale of allowance was not altered, it would cause an increase of crime to a serious extent. Mr. Lees (solicitor) remarked, that formerly the certificates of the magistrates for all the preliminary expenses of a criminal prosecution were allowed by the taxing-master as a matter of course; but since the late alteration in the allowances, the taxing-master either allowed or struck off any portion of the costs, without inquiring or assigning any reason. He added, that both medical men and solicitors were now so inadequately remunerated, that it did not answer their purpose to attend in such cases, and they avoided it whenever they could. He thought it would be advisable for each bench of magistrates to memorialize the Secretary of State on the subject, with a view of obtaining an amendment of the law.

THE CASUALTIES OF LIFE AND DEATH.

On the announcement of the unfortunate decease of the Hon. Mrs. Anson, from the misadventure of taking a phial of laudanum by mistake instead of a draught, we were prepared for some sagacious propositions founded on that event. Some of our contemporaries have noticed the misfortune with becoming regret, such as we usually see expressed by the press when any person of rank or distinction comes to a premature death in a railway collision, by poison, or any other casualty; but the *Morning Post* has gone a step further, and has discovered (?) how the late misfortune might have been prevented, and how similar disasters may in future be effectually guarded against, as follows:—

"The labelling of phials with the words 'Poison' and 'External use,' though a praiseworthy precaution, adopted by most druggists and medical men, is not a sufficient protection against this class of accidents. The means of protection, however, are not difficult to find. It consists in the adoption of an often repeated and as often neglected suggestion, to the effect that all poisonous medicines should (under a penalty for the infraction of the rule) be sent out in square bottles. All remedies for external use certainly ought to be dispensed in this way. It would also be a proper precaution to make it obligatory on Pharmaceutists of every denomination to send out poisonous medicines for internal use in phials of special form, so as to call attention to the hazard of taking doses more frequently or of larger amount than those competently ordered. A small and peculiarly grooved phial would be suitably distinctive for internal medicines liable in over doses to act as poisons. Labels and differently coloured glass have been recommended, but are not sufficient in themselves to prevent accidents. Nothing except a distinctive peculiarity of form recognizable in the dark, and universally enforced, can prove a measure of general safety."

The peculiarity in this scheme consists in the proposal to adopt a differently shaped bottle for medicines for external use, and for poisons to be taken internally. This is an attempt to reduce persons who can see to a level with the blind; but it would be but an approximation to safety, for after the "*Morning Post* bottle" had been recognized by the grooves, it would be necessary, nevertheless, to look at the label, as the dose of one medicine may be five drops, the dose of another a teaspoonful or two. Patients must therefore continue to use their senses, if they wish to be safe, in spite of any Act of Parliament that may be invented. There is another feature in this scheme which is original, and therefore worthy of remark. It is suggested that the Medical Council under the new Act might be made available for introducing and enforcing such regulations, under the comprehensive words, "*and containing such other matters and things relating thereto as the Council shall think fit*," which are comprised in the instructions for publishing a Pharmacopœia; and it is proposed that if these words should not confer sufficient power for the purpose, a short Act of Parliament might be passed to supply the deficiency. Such are the contrivances (of which this is a specimen) emanating from non-professional persons, who have no practical experience in the infinite variety of circumstances under which poisons are required and sold—who have no idea what would be the length of the list to

which the square and grooved bottle scheme, if consistently carried out, must be made applicable, the impossibility of enforcing it universally, and, as a consequence, the introduction of a new source of danger.

But in condemning this plan, we may be asked what we recommend instead of it? If the question have reference merely to the unfortunate accident above mentioned, there is nothing whatever in that case to call for the interference of the law. Every condition was complied with that any Act of Parliament could reasonably provide. The medicine was procured from a competent Chemist, it was properly labelled, the word poison being added on the bottle of laudanum. The patient was fully aware of the nature of both kinds of medicine, but instead of looking at the label *first*, she, by some unaccountable fatality, swallowed the poison first, and then sent her maid to read the label. Much as every one must regret this unfortunate event, it presents no features indicating a case for legislative interference. With as much reason might an Act be passed to provide against such cases as the following (reported in the *Observer*, Jan. 16): —A man fell down dead suddenly. On a post-mortem examination, a piece of salt beef, nearly two ounces in weight, was found in his throat, by which means he was suffocated. This is not a solitary instance of death from a similar mechanical obstruction. There is a disposition among theoretical legislators to treat the public like a child, and, disregarding the natural protection which the use of the senses affords, a variety of ingenious devices are invented, with a view of making accidents impossible, whether the parties concerned use due precautions or not. This is an attempt to throw on the Legislature the responsibility of every act of negligence or heedlessness that may occur, and in proportion the tendency would be to encourage carelessness and a disregard of the senses which are given to us for our safety.

Some of the most fatal and disastrous accidents of recent occurrence have resulted from the falling of houses, or portions of houses, in spite of the very elaborate and stringent Acts of Parliament intended to make such casualties impossible, by regulating the thickness of the walls, the size of timbers, the weight of iron supports, and every minute detail in the construction, where safety is concerned. The falling of the stairs at the Polytechnic Institution, by which several persons lost their lives, was attributed to some repairs which had been made in the steps, with a view of making them more safe and uniform. Thus we see that even in matters of the greatest importance, capable of being regulated by Act of Parliament, the precautions are sometimes accidentally disregarded, or some casualty occurs, which was not expected by skilful mechanics. How then could it be expected that the public would comply with the square or grooved bottle scheme, every deviation from which, if once introduced, would be a source of danger?

MISAPPLICATION OF THE TERM MONOPOLY.

Public opinion is tending in the right direction with regard to the proper remedy for the danger of accidents from poison. Although some parties cannot entirely shake off their predilection in favour of certain chimerical schemes, it is now universally acknowledged that the chief source of the evil, and the one which may be dealt with most easily and effectually, is the unrestricted sale of poisons by incompetent persons. The first resolution passed at the recent meeting at Manchester, reported in another part of this number, was a simple declaration that, "due regard being had to the case of those already established in trade, no person should be permitted to sell drugs or dispense medicines without a certificate of competency from some duly constituted public authority; and that, in all cases, the sale of poisons ought to be regulated by Act of Parliament." The Pharmaceutical Society was alluded to at the meeting; its objects and constitution explained; and it was the opinion of some speakers (which was favourably received by the meeting) that the Pharmaceutical Society should be the body authorized and empowered to carry the resolution into effect. In what manner the sale of poisons is to be regulated by Act of Parlia-

ment does not appear on the face of the resolution, and in the settlement of these regulations questions may arise involving all the difficulties of the Sale of Poisons Bill of last session. But, in the mean time, there is tangible, intelligible ground on which all parties agree—namely, that no persons should sell drugs and dispense medicines without a certificate of competency. In what manner, then, could this object be most easily and most effectually put in practice? The Pharmaceutical Society is the only body (not medical) which is empowered by Act of Parliament to conduct the examination required, and to grant certificates of qualification. But the powers of the Society only extend over its own members, whose examination and connexion with the Society are voluntary—the inducement to acquire the qualification consisting in the honorary distinction belonging to it. Looking at the requirements of the public in the small towns and villages in the country, there are places where a fully qualified Pharmaceutical Chemist would not be likely to establish himself, and where, nevertheless, it may be proper and necessary to allow some drugs, including poisons, to be sold, to supply the actual demands of the public. This is found to be the case in France, where Pharmaciens in business in the large cities and towns are required to possess certificates of the first class, while Pharmaciens of the second class are licenced to carry on business in small towns not exceeding a certain limit of population. If anything like this system is to be carried out in our own country, there can be no doubt as to the capability of the Pharmaceutical Society for extending its operations, so as to regulate the qualifications of all vendors of drugs; and if it be decided that there must be, as on the Continent, a second class of Druggists, licenced to carry on business in certain districts, it is obvious that both classes of certificate ought to emanate from the same source. If it were otherwise, and the grade of licenced Druggists were procurable from another Board, being on terms of rivalry with the Pharmaceutical Society, and granting certificates on lower fees and a less stringent examination, the Pharmaceutical Society would be unable to keep up its standard of qualification, and would be obliged to regulate its terms and conditions by those of the competing body. But there is a prejudice against what is termed a monopoly, and it has been remarked when an extension of the powers of the Society, as above indicated, was proposed, that this would be giving a monopoly to the Society. It is said it would not be proper to confer so much power on a private Society. It is, however, a mistake to call it a private Society. It is a chartered body, armed by Act of Parliament, with powers to regulate the qualifications of all Pharmaceutical Chemists in Great Britain, which it does by publishing a programme of the nature of the education required, and granting certificates of qualification after examination; for which purpose the Society has a Board of Examiners sitting in London and another in Edinburgh. The Society took the initiative in this movement many years before the public thought proper to give any attention to it, or even to admit that it was at all important. Much has been done by the Society in raising the qualifications of those who sell drugs and dispense medicines; the work is progressing, and the number of qualified Pharmaceutical Chemists is increasing every year. It is therefore greatly to the interest of the public that any fresh enactment should be so framed as to extend the usefulness of the Society, and enable it to carry out all that it was intended to accomplish. In case, however, the cry of "no monopoly" should be raised, and a divided jurisdiction established for regulating the qualifications of the vendors of drugs and dispensers of medicines, such legislation would not only be ineffectual for the object desired, but it would impede and obstruct the benefit the Society is, and has been for many years conferring on the public, by raising up as rapidly as its limited powers as a voluntary association will enable it, a qualified class of Pharmaceutists. It would be better that no law should be passed, than that the labour of so many years, hitherto eminently successful, should be sacrificed and lost to the public, in obedience to a blind prejudice against monopoly—a term not applicable in this instance in the sense in which it is usually understood.

The word monopoly, as usually understood, denotes some exclusive privilege conferred on certain parties for their own advantage and personal benefit, as in the case of a patent right, or the powers conferred by Parliament on railway, gas, water, and other companies. In the case under our consideration, the circumstances are entirely different. A public duty is to be performed. It is necessary that it should be performed with consistency, uniformity, and regularity throughout the kingdom of Great Britain. The duty consists in regulating the qualifications of the vendors of drugs and dispensers of medicines, and it can only be performed efficiently and uniformly by ONE CONSTITUTED AUTHORITY. The medical profession has had enough experience of the mischief arising from the competition of rival examining Boards, underbidding each other in the bad quality of their certificates, enticing young men to buy inferior diplomas at the cheapest market, and then turning them loose among men of the highest standing, with whom some of them probably possess no attribute in common except the letters M.D. The new Medical Act is framed with a view of putting an end to this confusion in the profession, which has been the source of the most complicated difficulties and disputes. The remedy consists in placing all the Examining Boards in the kingdom under the jurisdiction of the Medical Council; as we maintain that all the Examining Boards in the department of Pharmacy should be under the jurisdiction of the Pharmaceutical Society. No fault has been found with its laws, its bye-laws, or its mode of performing the duties assigned to it by Act of Parliament. It is an important fact that the Society *already exists*, that it is *ready for action*, the authorities possess experience in the duties to be performed, and the machinery of the Society is complete and capable of doing all that is required. It would be absurd to throw Pharmacy into the confusion and discord which for so many years disturbed the medical profession, in obedience to a blind prejudice in favour of competition, and a delusive dread of monopoly.

If it be thought desirable to guard against abuses or neglect of duty by placing the Society more directly under the control of the Government, there would be no difficulty or objection to such an arrangement. The bye-laws are already under the Home Secretary, and the appointment of some of the examiners, with some other general arrangements, might be placed under the same jurisdiction.

THE ADULTERATION OF FOOD AND DRUGS.

THE practice of adulteration, although frequently discussed in connexion with the sale of poisons, requires to be dealt with separately, and at the late meeting at Manchester it was made the subject of a distinct resolution. Our space did not admit of anything more than a very brief outline of that part of the proceedings; but the speakers went through the usual catalogue of frauds and adulterations, which produced the usual sensation at the time, and were followed, as usual, by letters and paragraphs in the local newspapers contradicting some of the statements and denouncing others as much exaggerated. One correspondent writes a letter to point out the absurdity of supposing that sawdust is used systematically to adulterate chicory, when he calculates that the extra profit on 1 cwt., supposing a peck of sawdust to be mixed with it, would only be about 8*d.*, and for this trifling advantage the quality would be so sensibly injured as to destroy its value in the market. Another writer notices the statements about bone dust, chalk, and other rubbish said to be used wholesale for adulterating flour, and he ridicules the idea of a labouring man being reduced to a state of emaciation, as described in the meeting, by the mixture of a portion of rice meal in his bread. He also gives instances of food being erroneously condemned, and afterwards proved, on the testimony of eminent Chemists, to be genuine.

Some rather amusing letters have appeared about the use of alum in bread, and the advantage or otherwise of the practice. With regard to the appointment of Government officers and inspectors, we are told by a writer in the *Manchester Examiner*, "there was a strong impression with parties present that a bid was making for an appointment of this kind by more than one of the speakers," and the probability of abuse of power under such a system was pointed out, especially on the supposition that the inspectors would have power of entry and search on the premises of all dealers in food. It appears to be the general opinion, and it was admitted to be the case at the meeting, that the rich and educated classes have very little ground for complaint. They can obtain what they require, whether food or medicine, free from adulteration, and of a quality such as to satisfy any reasonable person. But they must attend to the maxim "*caveat emptor*," and be content to pay a fair price. Persons who are always on the look-out for cheap shops, and will not allow a tradesman a living profit, must expect to meet with articles of inferior quality, or manufactured to suit their peculiar fancy. But the parties who have a just ground of complaint, and who may fairly claim the protection of the law, are the poorest and most ignorant of the community, who have no power to make a selection, but must buy from hand to mouth by the pennyworth, or such sum as they can raise, the food and other articles offered for sale in the low neighbourhoods in which they live; who have no time to go further in search of a better shop, and no money to spare to pay for quality, even if they had the capacity to make the selection. Again, the guardians of the poor, and those who purchase stores for public offices, have much to answer for in regard to adulteration. We have often known contracts taken at prices which every one present knew could not pay for the articles described, but whether the vendor sold at a loss in the hope of making a better bargain next time, or whether the article was reduced by dilution to the price agreed upon, or whether one of the officials was bribed to "pass" short weight, the purchasers, having taken the lowest tender, and thus, as they suppose, saved the parish money, go home to dinner, where, if they were to be served with any of the goods they have just purchased, they would cry out for a Government inspector, and an Act of Parliament to punish the delinquents. In these cases the purchasers are quite as culpable as the vendors, and deserve the same punishment.

The resolution on adulteration at the Manchester meeting was simply a recommendation to extend the powers of corporate and other local authorities, enabling them to inspect all food offered for sale, and to punish the vendors of such as may be found injuriously adulterated. If this regulation be intended to apply to food purchased by the said corporate or local authorities for the use of the poor under their charge, it is either needless, because they already possess that power by the aid of their officer of health, or useless, because, if they neglect their duty by purchasing rubbish instead of food for the sake of cheapness, the remedy should be in other hands, as they are not likely to punish themselves. If it be intended to give the said authorities power to inspect the shops in low neighbourhoods frequented by the poor and helpless, whom the law ought to protect, then under suitable restrictions the proposed supervision would be very proper. If, however, it be intended that the powers vested in the authorities should be *general* and *universal*, and that any person having purchased food suspected to be adulterated, might go to the inspector and have it examined, in that case the plan would defeat itself, by removing the responsibility from the purchaser, who, disregarding the "*caveat emptor*," might indulge in cheap shops and inferior goods, throwing on the inspector the trouble and responsibility of protecting him. There would be another instance of the attempt to supersede the use of the senses by Act of Parliament.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

AT A MEETING OF THE COUNCIL, *5th January*, 1859,

Present—Messrs. Bell, Bird, Brew, George Edwards, Hanbury, Meggeson, Morson, Sandford, Squire, and Waugh, the following were elected

MEMBERS.

LONDON .....Turner, Charles Ernest
WELSHPOOL .....Williams, Thomas Kemble
WOODSTOCK ....Prosser, Thomas Evan
WORCESTER .....Twinberrow, John

MINOR EXAMINATION, 18*th January.*

Green, Conrad Samuel.....Stratford-on-Avon
Hayward, Charles John.....Lincoln
Roberts, Albinus John .....Horsham
Waugh, Alexander.....Southampton
Young, William.....Banbury

REGISTERED APPRENTICES.

NAMES.	RESIDING WITH	ADDRESS.
Carter, Thomas	Mr. Dresser	York
Cooper, Henry	Mr. White	Nottingham
Wilson, Francis	Mr. Lord	Rochdale

PHARMACEUTICAL MEETING.

Wednesday, January 5th, 1859.

MR. DANIEL BELL HANBURY, TREASURER, IN THE CHAIR.

THE following

DONATIONS TO THE LIBRARY AND MUSEUM

were announced :—

Memoirs of the Literary and Philosophical Society of Manchester:—First Series, Vols. IV. and V.; Second Series, Vols. II to XV.
Proceedings of the Literary and Philosophical Society of Manchester, Nos. 1 to 14.
New System of Chemical Philosophy, by Dr. Dalton.
Meteorological Observations and Essays, by Dr. Dalton.
Essays on Microcosmic Salt, by Dr. Dalton.
Memoir of Dr. Dalton, and History of the Atomic Theory, by Dr. Angus Smith. (From the Literary and Philosophical Society of Manchester.)

Medico-Chirurgical Transactions, Vol. XLI., from the Society.
Principles and Rudiments of Botany, by C. R. W. Watkins, from the Author.
Report of the Art-Union of London, from the Council of the Art-Union.
Journal of the Photographic Society, from the Society.
Journal of the Society of Arts, from the Society.
On Tests for Arsenic, by Dr. Guy, from the Author.
Specimens of *Larinus maculatus* and its coccoon, from Mr. Hanbury.

MR. DANIEL HANBURY, in presenting to the Society a specimen of *Larinus maculatus* and its coccoon, begged to offer a few remarks upon the insect, and to explain upon what grounds it deserved a place in a collection of pharmaceutical substances. Mr. H. stated that among the drugs sent from Constantinople to the Paris Exhibition of 1855, were certain insect-coccoons, called *Tréhala*, which are used in the East in the form of decoction, on account of their saccharine and amylaceous properties. In an interesting paper lately pub-

lished,* M. Guibourt has pointed out that under the Persian name of *Schakar tigal*, these coccoons were described by Father Ange, in his *Pharmacopœia Persica*, so far back as the year 1681, but that until attention was drawn to them in 1855, they were practically unknown to pharmacologists.

Mr. H. added that from specimens collected by Mr. Loftus at Kirrind, in Persia, in the year 1851, and now in the British Museum, it had been ascertained that the insect which produces *Tréhala* is *Larinus maculatus* of Faldermann. This insect, which is a beetle about half an inch in length, belonging to the family *Curculionidæ*, forms its coccoons upon a species of *Echinops*, probably the *E. persicus* of Fischer.

The coccoons are interesting in a chemical point of view, from the fact of their affording a peculiar species of sugar, to which the name *Tréhalose* has been given by M. Berthelot.†

The following

COMMUNICATION FROM THE PRESIDENT

was read:—

Being prevented by the state of my health from attending in my place at the Pharmaceutical meetings during this session, I take the alternative of addressing in writing to the Members a few remarks which appear to be called for in the present position of the Society, having reference to the responsibility which rests on us as a body, and the opportunity we have before us of taking and maintaining our place as the representatives of Pharmacy. The exciting cause of this allusion to the subject, is the recent official application to the Society on the part of the Medical Council for assistance in the preparation of the British Pharmacopœia, which will afford abundant materials for discussion at these meetings on subjects with which the Members generally are familiar, and likely to be interested. It has been for many years a ground of complaint, that no such opportunity was afforded for considering and discussing before publication the merits of a work professedly the text book of our laboratories; and it seemed rather inconsistent, that in the compilation of such a work, the Chemists, who are practically conversant with the manipulations referred to, were never consulted, while the onus devolved on the College of Physicians, whose Members are prohibited from practising Pharmacy, so much so, that any Member proved guilty of that offence, would be liable to expulsion from the College, and consequently incapacitated from acting on the Pharmacopœia Committee. It resulted from this arrangement that the Pharmacopœia was submitted to the test of practical experience after its publication instead of before, and although the services of a Chemist were usually obtained in revising the processes, and the opinions of others might occasionally be asked *sub rosâ*, yet the responsibility rested entirely with the College; the work was open to criticism, and strict obedience to its instructions was found to be in some instances very difficult, in others scarcely practicable. The first step towards the introduction of a pharmaceutical element into the Pharmacopœia Committee consisted in the appointment of a Committee of this Society in 1854, to assist the Committee of the College in the work. Some progress had been made by these two Committees (retarded, however, by the difficulty of amalgamating the three Pharmacopœias) when the Medical Act was passed, transferring the publication of the Pharmacopœia from the three Colleges to the General Medical Council. Another step in the right direction has been taken by the Medical Council, and delegates from the Society in London and Edinburgh have been appointed to assist the Pharmacopœia Committee. The sincerity of the Pharmaceutical Chemists will now be put to the test. We have complained that we were slighted and not consulted on subjects in which we flattered ourselves that our advice

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* *Comptes Rendus*, 21 Juin, 1858, p. 1213.
† *Ibid.*, 28 Juin, 1858, p. 1276.

and assistance might have been useful: that not only in this respect, but in legislation on matters affecting our interests and position we were entirely disregarded, and very unjust and objectionable Bills were brought into Parliament, entailing upon us the expense and trouble of an opposition. Symptoms of a reaction have lately been manifest. The Pharmaceutical Society has been referred to on several occasions, and is now rapidly acquiring a recognized status towards which it has been gradually tending for many years. The progress of an institution of this kind must inevitably be slow in the first instance. Time is required to prove that the promoters and active supporters are in earnest in the undertaking, and that it is founded on right principles, and calculated to be useful to the public. The Pharmaceutical Society has thus far made favourable progress, and after many years of probation and persevering exertion, is taking up a position from which it will be the fault of the Members if it should ever be displaced.

The responsibility now thrown on the Society by the participation in the preparation of the British Pharmacopœia, is likely to exert an important influence, beneficial or otherwise, according to the mode in which the subject is dealt with and the spirit with which the duty is performed. If the Members should fail to take advantage of this opportunity of bringing their practical experience to bear upon so useful an undertaking; if our professions of ability and willingness to assist should disappoint the expectations of those who have invited us to join them, some discredit would unquestionably fall on the Society; but if the appeal should be promptly responded to, and a variety of useful suggestions offered to the Committee, resulting in a manifest improvement of the Pharmacopœia, a share of the credit will belong to all parties concerned, and the experiment of uniting the practical experience of the Pharmaceutist with the skill and knowledge of the Physician in such a work will be pronounced successful.

In case any Members should inquire in what manner they could assist in this very desirable movement, it may be proper to state, that the Council of the Pharmaceutical Society is constituted the Pharmacopœia Committee, of whom several members (chiefly those residing in London) are a sub-committee, with power to add to their number. The sub-committee meets frequently to consider seriatim the various preparations, processes, and other contents of the Pharmacopœia, some of which will be brought under the notice of the Members at the Pharmaceutical Meetings. When these meetings are numerously attended by the Members, they become a court of appeal at which the opinion and experience of the Society may be gathered on subjects relating to Pharmacy, and especially in reference to preparations of the Pharmacopœia, with which all are more or less familiar. The Committee will be glad to receive papers or suggestions from any Members of the Society whose experience may enable them to point out defects in any preparations of the present Pharmacopœias, or to propose improvements. Some subjects will be brought forward by the Committee or Members of it, but, considering the extent of the work and the number and variety of substances and preparations comprised in it, there can be no deficiency of materials for discussion during the remaining meetings of the session. The principal object of these remarks is to urge upon the Members generally the importance of attending the Pharmaceutical Meetings, especially at the present time; and to remind them that, individually as well as collectively, they have the opportunity of assisting in a good cause, either by bringing forward papers for discussion, in which their experience enables them to throw some light, or by taking part in the proceedings when the Members are appealed to for their opinions on any given subject.

The Chairman much regretted that the state of Mr. Bell's health had rendered it necessary for him to make his communication in writing. They would all feel more than ever the obligation they were under to their President for the interest he took in the welfare of the Society, and he trusted the Mem-

bers would be stimulated to more active exertions in furthering the objects Mr. Bell had so much at heart.

Mr. Waugh thought if any one had the right to admonish them it was Mr. Bell, who had always been the most active among those who were engaged in conducting the affairs of the Society. Indeed, they had been accustomed to rest so much upon the assurance that whatever was required to be done for the Society would not be neglected while Mr. Bell was able to attend to it, that, now they were for a time deprived of that aid, it became necessary to stimulate the Members to a more general interest in the proceedings, not only of those meetings, but of the Society generally. With reference to the Pharmacopœia, he might state, as a member of the Pharmacopœia Committee, that although they met often, and had got through some amount of work, yet much remained to be done, and it was desirable to have a more general expression of opinion from those whom the Pharmacopœia concerned.

Mr. Daniel Hanbury said those only who were intimately acquainted with Mr. Bell could know how deeply he had at heart the interests of the Pharmaceutical Society, and how acutely he felt at the present time the responsibility that rests upon the Society with reference to the new Pharmacopœia.

Dr. Redwood said they must all wish to relieve the anxiety Mr. Bell felt on the subject of the Pharmacopœia, and they could not more effectually do so than by enlisting the services of as large a number as possible of those Members of the Society who could either contribute the results of their experiences, or aid in the investigation of questions which required explanation. He thought some further organization was required than at present existed, to enable the Society to accomplish what was expected from it. The Pharmacopœia Committee had collected much valuable information which many Members throughout the country had contributed, with reference to the extent to which different medicines are used. Suggestions had been made for the omission from the Pharmacopœia of some of the medicines hitherto retained there, and for the introduction of others which have not yet been recognized by any of the British Pharmacopœias. Investigations had also been made, and chiefly by Members of the Committee, with the view of improving some of the processes at present in the Pharmacopœia. There were several of the processes the results of which were acknowledged to be unsatisfactory, and no doubt many others would admit of improvement, if well directed investigations were made with reference to them. Now, what he would suggest was, that a Committee should be appointed, not confined to the Council, but comprising all those Members of the Society who possessed the means and the disposition to aid in the proposed object of considering what were the desiderata for the improvement of the Pharmacopœia, and of undertaking the investigations which were required. Such Committee should consist of none but active working Members, who would meet at frequent intervals to report results, and to discuss what had been done, and what was considered still to require doing. Such discussions as had occurred on *Linimentum Saponis* and *Unguentum Cetacei*, would properly belong to such a Committee, and the subjects, after having been discussed there until their investigation was thought to have been carried far enough, would form suitable matters for papers to be communicated to Pharmaceutical Meetings comprising Members of the body at large. The opinions of the Members would be thus fully and fairly represented, as any Member could express his opinions either at the Meetings or in the *Pharmaceutical Journal*, where the reports of the Meetings were published. It would then be left to the Council, as at present, to decide what recommendations, founded upon the facts laid before them, should be made, through their delegate, to the Medical Council. He thought this the only method by which the Society could be enabled satisfactorily to accomplish what was expected from them, and what they had the power, if rightly directed, of doing with credit to themselves and advantage to others.

The following papers were read :—

ANALYSIS OF A CHALYBEATE WATER IN KENSINGTON GARDENS.

BY MR. J. B. BARNES.

The spring is called St. Gover's Well, and is situated on the south side of the Gardens, between the round pond and the Kensington Road. It was discovered about three years ago by some workmen engaged in draining between the pond and the trees on the south side, at about thirty yards from the spot where it now issues. Here a neat drinking fountain has been erected for public use. In the summer season numbers of persons resort to the well for the purpose of drinking the water medicinally.

The interest taken in it by some of its frequenters has induced me to make a chemical examination of this water. The flow of water during the last summer and autumn was slow, but after wet weather the supply is considerably increased.

The water used for this analysis was collected on the 9th of September, 1858. As it issues from the spring it is clear and limpid, it has no smell, but possesses a decidedly chalybeate taste. It is acid to litmus. Its specific gravity, compared with distilled water at 60° F., is 1.001. The temperature of the water was 59° F., the temperature of the air being 70° F.

A qualitative analysis showed the presence of the following substances :—

BASES.		ACIDS.	
Potassa.	Magnesia.	Hydrochloric Acid.	Carbonic Acid.
Soda.	Protoxide of Iron.	Nitric Acid.	Silicic Acid.
Lime.	Ammonia.	Sulphuric Acid.	

Organic matter.

Bromine and iodine were tested for in a portion of the solid residue obtained upon evaporating ten gallons of the water, but without success. The bases which are precipitated by sulphuretted hydrogen in acid solutions were tested for in the same residue, also without success.

The method of quantitative analysis which was followed is that usually employed. Chlorine and sulphuric acid were determined in separate quantities of the water by means of nitrate of silver and chloride of barium. The lime, magnesia, iron, and silicic acid, as follows:—To a portion of the water a little nitric acid was added, heat applied to expel the carbonic acid, the water was evaporated to dryness, the dry residue digested with hydrochloric acid, some water added, a gentle heat applied, and the fluid filtered off from the silicic acid, which was now washed with hot water, dried, ignited, and weighed. From the filtrate the iron was precipitated by ammonia, dried, and determined as peroxide. The lime was subsequently separated as oxalate and estimated as carbonate, and the magnesia by phosphate of soda, and weighed as pyrophosphate.

The alkalies were estimated in a separate portion of the water, which was evaporated to about one half its bulk, and a little hydrochloric acid added, the iron, lime, and magnesia were precipitated by baryta water, filtered off, and washed, the filtrate was evaporated, and the excess of baryta removed by carbonate of ammonia, the liquid was evaporated to dryness and ignited, to expel the ammoniacal salts, the residue was treated with distilled water, filtered, and evaporated to dryness, which process was repeated over and over again, until the last traces of baryta were removed. The resulting chlorides were now weighed. The potassa was separated from the chlorides by adding a solution of bichloride of platinum in excess, the mixture was evaporated nearly to dryness in the water-bath, and the residue treated with rectified spirit, it was set aside for a day, and the sodio-chloride of platinum filtered off from the potassio-chloride of platinum, this salt was washed with spirit of wine, dried in a water oven, and weighed. The proportion of chloride of potassium in the potassio-

chloride of platinum was calculated, which figure subtracted from the weight of the mixed chlorides, gave the amount of chloride of sodium present.

For the estimation of the carbonic acid, a small quantity of ammonia and some chloride of calcium was placed into four Winchester quarts, each of an equal capacity, they were then filled with water at the well, the precipitates which formed in each bottle were collected severally upon tared filters, dried at 212° F., and weighed, the precipitates were mixed together, and weighed portions employed for the determination of the acid. Nitric acid being present only in small quantity was not estimated. The ammonia was expelled with the organic matter.

The following numbers were obtained :—

Determination of Silica.

	Water employed.	Silica obtained.	Silica in 1000 parts.
1.	1162.98 grams.	0.018 gram.	0.0154
2.	1162.98 "	0.017 "	0.0147
		Mean.....	0.015

Determination of Iron.

	Water employed.	Peroxide of Iron obtained.	Peroxide of Iron in 1000 parts.
1.	1162.98 grams.	0.027 gram.	0.0232
2.	1162.98 "	0.030 "	0.0257
		Mean.....	.0244

Determination of Lime.

	Water employed.	Carbonate of Lime obtained.	Lime in 1000 parts.
1.	1162.98 grams.	0.049 gram.	0.0236
2.	1162.98 "	0.050 "	0.0241
		Mean.....	0.0238

Determination of Magnesia.

	Water employed	Pyrophosphate of Magnesia obtained.	Magnesia in 1000 parts.
1.	1162.98 grams.	0.028 gram.	.0087
2.	1162.98 "	0.030 "	.0094
		Mean.....	.0090

Determination of the Alkalies.

	Water employed.	Mixed Chlorides obtained.	Chlorides in 1000 parts.
1.	1162.98 grams.	0.046 gram.	0.0395
2.	1162.98 "	0.050 "	0.0429
		Mean.....	0.0412

Determination of Potassa.

	Water employed.	Chloride of Potassium and Platinum obtained.	Potassa in 1000 parts.
1.	1162.98 grams.	0.021 gram.	0.0058
2.	1162.98 "	0.030 "	0.0078
		Mean.....	0.0066

Determination of Sulphuric Acid.

	Water employed.	Sulphate of baryta obtained.	Sulphuric acid in 1000 parts.
1.	387.66 grams.	0.050 gram.	0.044
2.	387.66 "	0.050 "	

Determination of Chlorine.

	Water employed.	Chloride of silver obtained.	Chlorine in 1000 parts.
1.	129.22 grams.	0.015 gram.	0.0286
2.	129.22 "	0.015 "	

Determination of Fixed Residue

Water employed.	Residue obtained.	Residue in 1000 parts.
1162.98 grams.	0.231 gram.	0.2004

Determination of Organic Matter and Salts of Ammonia.

Water employed.	Organic matter and Salts of Ammonia obtained.	Organic matter and Salts of Ammonia in 1000 parts.
1162.98 grams.	0.040 gram.	0.035

Determination of Carbonic Acid.

	Water employed.	Precipitate obtained.
1	2519.79 grams.	0.709 gram.
2	2519.79 "	0.739 "
3	2519.79 "	0.770 "
4	2519.79 "	0.770 "

	Precipitate employed.	Carbonic Acid obtained.	Carbonic Acid in 1000 parts.
1	0.815 grams.	0.330 gram.	
2	0.790 "	0.315 "	0.1187
	Mean 0.804	Mean 0.322	

Total Carbonic Acid contained in the gallon.. ..... 8.302 grains

Carbonic Acid existing in combination

with Protoxide of Iron	0.939 grains
with Magnesia	0.112 "
	1.051 grains

Free Carbonic Acid remaining ..... 7.251 grains

From the preceding details, it may be inferred that a gallon of the chalybeate water of St. Gover's Well contains :—

Sulphate of lime	4.046 grains
Sulphate of magnesia	1.060 "
Chloride of magnesium	0.419 "
Carbonate of magnesia	0.218 "
Chloride of sodium	2.420 "
Chloride of potassium	0.460 "
Carbonate of iron	2.476 "
Organic matter and salts of ammonia..	2.450 "
Silica	1.050 "
Total	14.599

Total residue by experiment	14.028 grains
Free carbonic acid	7.251 "

In answer to some questions, Mr. Barnes stated that the quantity of water flowing from the well was never great, and that it fluctuated a good deal according to the state of the weather.

FURTHER REMARKS ON LINIMENTUM SAPONIS.

BY MR. HENRY DEANE.

For the purpose of testing the properties of soap liniment made with different proportions of water, and with hard and soft olive oil soaps, the formula of the Edinburgh College was adopted as a standard, because, containing the same quantity of soap as that ordered by the London College, it contains a larger quantity of oil of rosemary, which is mentioned as a separate ingredient, and is capable of acting in some degree as a test of the solvent powers of the other ingredients. The formula is as follows :—

Hard Olive Oil Soap	℥iiss.
Camphor	℥j ℥ij.
Oil of Rosemary	f.℥iij.
Rectified Sp. Wine	f.℥xx.

Preparations were made according to this formula, also with half the quantity of soap, with soft soap substituted for hard, and with spirit diluted with different proportions of water substituted for the strong rectified spirit. The hard soap used was mottled Castille soap in its ordinary condition as supplied by the wholesale houses, and this was sliced and dried quickly, and used before any great change of colour had taken place in the contained oxide of iron. This kind of soap was preferred as being more uniform in character, and less likely to be spurious than that sold as white Castille soap, a great deal of which is said to be made in this country with solid fat instead of olive oil.

In the preparation of No. 1 to No. 5, in the following table, the full quantity of hard soap was used, but the spirit was of different degrees of strength. In No. 6 the spirit was of full strength, but only half the quantity of soap was used. Nos. 7, 8, and 9 were made with soft olive oil soap.

	Strength of Spirit employed.	Temperature at which solution was effected.	Temperature at which the liniment became solid or otherwise.
No. 1.	Rectified Spirit	90° to 100°	Solid at 60°
2.	Rectified Spirit 18 Water 2	"	Partially solid at 60°
	Proportions of the P.L.		
3.	Rectified Spirit 16 Water 4	"	Partially solid at 45°
4.	Rectified Spirit 15 Water 5	"	Ditto
5.	Proof Spirit	"	Liquid at 40°
6.	Rectified Spirit	"	Partially solid at 55°
7.	Rectified Spirit	60°	Liquid at all temperatures
8.	Proof Spirit	"	Ditto
*9.	Proof Spirit	"	Ditto

It will be seen by reference to this table that when hard soap is used, if the spirit be much stronger than proof the liniment is liable to become gelatinous in cold weather, and to be unfit for pouring from one bottle to another; and even if the quantity of soap be reduced to half while the spirit is of full strength (No. 6) the same result ensues. Proof spirit would therefore appear to be the proper solvent for hard soap.

If soft soap be used, the liniment remains liquid at all temperatures, whether made with rectified or proof spirit, but it is open to some objection when made with the latter.

It has been suggested that ingredients which are sometimes ordered in conjunction with soap liniment, would not mix with it if the soap liniment were made with spirit so weak as proof spirit, such, for instance, as chloroform, and compound camphor liniment. It has also been suggested that soap liniment made with soft soap will decolourize compound tincture of iodine. With the view of determining these points the following mixtures were made.

Chloroform.—One part of chloroform and three parts of soap liniment formed a mixture from which no separation took place, whatever was the strength of the spirit, between rectified and proof spirit, used for making the soap liniment; but a much larger proportion cannot be mixed with the liniment if made with proof spirit.

Compound Camphor Liniment.—Four drachms of soap liniment made by each of the processes referred to in the table were mixed with two drachms of tincture of opium and two drachms of compound camphor liniment. The result was similar in all the cases; a precipitate being formed in each.

* In No. 9 the soap, &c., were first dissolved in rectified spirit, the solution filtered, and water then added to reduce the spirit to the strength of proof.

Compound Tincture of Iodine.—One drachm of this tincture was mixed with nine drachms of soap liniment made according to the processes Nos. 5, 6, 7, 8, and 9 in the table. When No. 5 was used the liniment became decolourized in ten days. When No. 6 was used there was a slight loss of colour in ten days. With Nos. 7 and 9 the loss of colour was very slight in ten days. With No. 8 perfect decolourization took place in two hours.

From these experiments I infer that, although soap liniment made with either rectified or proof spirit, and hard or soft soap, mixes very well with certain ingredients which are likely to be added to it, yet as the liniment made with proof spirit and an alkaline soap decolourizes tincture of iodine, which is not unfrequently ordered with it, and as proof spirit liniment will not dissolve so large a proportion of chloroform as is sometimes required to be mixed with it, it seems desirable that the liniment should be made with rectified spirit.

Should the medical profession consider that a slight variation in the quantity of soap contained in the liniment is not important, the fact that soft soap contains a somewhat variable quantity of water need not be an impediment to its use; and the objection which attaches to soft soap on account of its containing uncombined carbonate of potash, may be removed by adopting a process such as that described for the liniment No. 7 or No. 9 in the foregoing table.

Note.—Since the above experiments were made, the possibility of readily making a soap liniment with hard soap which shall be liquid at all ordinary temperatures has been suggested, and renders further experiments needful before a final conclusion can be arrived at, the results of which we hope to lay before the next meeting.

Some discussion took place with reference to the relative importance of the different ingredients of soap liniment, some considering that its efficacy as a liniment depended upon the stimulating effects of the spirit, aided by the camphor, and therefore that strong spirit should be used, while others thought the strength of the spirit unimportant, but that the purity of the soap was important.

PHARMACEUTICAL MEETING, EDINBURGH.

A SECOND Scientific Meeting of the present session was held on the evening of Thursday, 13th January, in George Street Hall, at 9 o'clock, P.M.,

MR. JAMES ROBERTSON, PRESIDENT, IN THE CHAIR.

The following remarks, written by Mr. Burrell, of Montrose, were read by the President. Before commencing, he stated that the paper he was about to read was written with a view to forming part of the proceedings at a conference of Chemists held early in September, in Dundee, but, from the length of time occupied in other matters, it was so late, that the author was allowed to withdraw it, on condition that it was read at one of our early meetings in Edinburgh. This, he mentioned, it was the more necessary to intimate, as there were some remarks regarding the Pharmacopœia which could not otherwise be understood.

The PRESIDENT then read the following paper :—

CURSORY REMARKS ON PHARMACY—AS IT WAS, AS IT IS, AND AS IT OUGHT TO BE.

IT has been remarked, that had the old alchemists, in their efforts to convert the baser into the more precious metals, and to discover the elixir of life, which was to preserve perpetual youth, given the details of their unsuccessful experiments, they would have conferred a lasting benefit on science. Taking that view of the labours of the older pharmaceutists, we should certainly be grateful to them for their very minute accounts of their various processes. A remark or two on a few of the characteristics of their compounding may be interesting, if not instructive, to us of the present generation.

Simplicity was *not* a characteristic of their system. The efficacy of a compound

they seemed to think depended as much upon the number of the ingredients, as the peculiar properties of each. Instead of employing one or two detectives to catch a thief, they employed a whole regiment—artillery, cavalry, and infantry. For example, Mithridatium—named after its reputed author, Mithridates, King of Pontus and Bithynia—mustered fifty ingredients. As our time is short, I will not call the roll.

Theriaca Andromachi, or Venice treacle, concocted most appropriately by Andromachus, physician to Nero, mustered sixty-four ingredients. A French author, Charus, wrote a whole treatise on this celebrated compound, which was largely exported from Venice, where it was made. The wise man had said there was safety in the multitude of counsellors, and our forefathers doubtlessly concluded there would be the same in the multitude of ingredients.

Neither could these compounds be characterized as pleasant or elegant. Half a dozen live vipers, macerated in canary wine, would certainly require an Anglo-Saxon stomach to receive or retain ; yet these deadly animals were a favourite remedy not 150 years ago. Their high price, however, confined their use to the wealthy, the commonalty, I presume, getting Thames eels as a substitute. Millipedes, or hog lice, was also a favourite remedy at that time. They were made into a wine and spirit, and I have no doubt made up in *body* what they wanted in *flavour*. They were considered of great efficacy in jaundice, affection of the kidneys, &c. The principle which regulated our ancestors in the choice of their ingredients, seems to have been that the products of animals would impart the same qualities that the animals themselves possessed. Vipers, for example, were very tenacious of life, and they concluded that, if medicated, they would produce the same quality in the human species ; as if, by living entirely on brains, a stupid man might be made a very clever one. Hence inspissated urine was used in affection of the kidneys, &c.

The efficacy of these compounds it is needless to speculate upon. But as most diseases were supposed to arise from certain humours or juices, which, according to their notions, seemed to play about the inside like an east wind, their remedies were all directed against these troublesome inmates.

For example, Dr. Quincy, an author of repute in the eighteenth century, says of a pill composed of euphorbium, colocynth, &c., made into a mass with juice of leeks, that "it is a most efficacious medicine to purge off tough pituitous humours. All kinds of asthmatic and rheumatic pains will give way to it, for it fetches from the most remote parts the humours which cause them." Again, the same author, in his remarks on a certain kind of bath for consumption—four recipes for which he gives, says :—"In hectic habits this is of great service, because it helps to give a consistence and softness to the humours, whereby they neither run so fast in the canals, nor wash away with them the substance of the parts," &c.

The pharmacy of the present day is undoubtedly of a superior grade to what it has ever been. We have discarded all those heterogeneous and disgusting compounds which our forefathers delighted in, and which I presume inspired the then rising generation with that horror of physic, which even yet we have to contend with. And not only have we simplified and improved the processes of compounding, and made great and valuable additions to the Materia Medica, but we have isolated the proximate principles of the most potent drugs, and thereby gained an army of remedial agents, as superior to the medicaments of other days, as the Enfield rifle is to the old "Brown Bess."

The various alkaloid salts of quina, morphia, strychnia, &c., would have astounded the old pharmaceutists by their simplicity and power ; while the energetic extracts, yielded by the agency of steam, and the varied beauty of the crystalline bodies we daily use, would have extorted their unbounded admiration. But we must not forget that we too shall be the ancestors of other generations, who will examine our processes with the same curiosity we expend on those who have gone before us. If we could imagine a pharmaceutist gazing at us from the heights of 1958, we should not be surprised to hear him characterize us as a peculiar race; for by that time our calling will be recognized as a distinct profession, and all who follow it will be intelligent and educated men. They will be puzzled to understand how *we* should sit at the door of the Temple of Science, like mere money-takers, while they, as regular guild-brothers, sit in the Temple itself. They will smile at the fact of this United Kingdom having three different Pharmacopœias ; and at a time when the telegraph and steam locomotive had not only welded England, Scotland, and

Ireland into one nation, but had brought even our distant colonies into integral union with the mother country, a gouty Englishman would get Acetum Colchici three times stronger in Dublin than in Edinburgh or London ; and if he required an opiate in Edinburgh or Dublin, he would have to take double the quantity of Liq. Morph. Hydrochlorat. he was accustomed to take in London. The Pil. Rhei Co. he swallowed in London flavoured with Ol. Carni, he found in Edinburgh or Dublin redolent of peppermint; and 3j., which meant 60 grs. in London, dwindled down to 54.7 in Dublin !

And these discrepancies, dangerous in some cases and unnecessary in all, maintained apparently for no other reason than that three united nations might physic their own people according to the most disunited principles !

But in 1958 all this will be changed—there will be one National Pharmacopœia, containing the united wisdom of the medical classes, including of course the Pharmaceutist; there will be one to prescribe, one to compound; and the whole tribe of herbalists, worm doctors, and quackery in general, will have disappeared before the light of general intelligence. I believe it is a maxim among clergymen, that they should leave their livings better than they found them. That end should be ours also, and we would find that, by promoting the general interests of the profession, we advanced our own. Pharmacy will never be as it ought to be until Pharmaceutists have a distinct position as professional men. We should be as superior to the old compounder of medicine as the surgeon of the present day, with his advanced skill and his chloroform, is to his rude predecessor, who amputated a limb with a knife red-hot or steeped in aquafortis, to prevent hemorrhage. We will do no good until we are united in one harmonious body, governing ourselves, stimulating and instructing each other, and having a decided voice in the admission of members into the profession. We have abundant opportunities in the daily exercise of our duties of ascertaining facts in chemistry, which, if properly investigated, might lead to important results, but which, after exciting a temporary interest and curiosity, are soon forgotten, from the mere want of the stimulus of social communication. When the charter of the Pharmaceutical Society was obtained, there was an idle outcry about interfering with the principle of free trade. That notion was absurd, for the object of the Society was not to secure a monopoly, but to give a guarantee to the public that those who sold medicines knew something of what they sold. It would be simply absurd for a shoemaker to call himself a tailor, and to make clothes in the same way he made shoes—a spoiled suit would soon drive away his customers, and there it would end. But it would be worse than absurd for a shoemaker to call himself a druggist and compound medicines, without knowing anything of their properties; for human life is a more sacred thing than clothes and shoes, and the loss of *it* would not end simply in the loss of a customer, but in the stern embraces of the law.

It is therefore our duty to ourselves as well as to the public, to elevate our profession, and to exclude, if necessary, all who are incompetent to discharge its obligations; and to attain that object, we must begin by improving ourselves. The Pharmaceutist, I conceive, should stand to the higher grades of the medical profession in the same relation the engineer does to the natural philosopher.

The philosopher investigates and determines the laws that govern material bodies, and the engineer applies them to practical purposes. So we should know all that the physician, the chemist, and the botanist can tell us of the properties of medicinal bodies, and it should be our province to prepare these bodies in such forms as may be applicable to the cure and alleviation of disease.

Hence to attain to the full height of our profession we would require a liberal education, and to go through a course of systematic study. We should not be jackals, depending on rejected fragments left by the higher animals, but fellow-workers with the men of science, occupying, it may be, a lower platform than the physician and surgeon, but relatively not lower than an engineer, like George Stephenson stood to a philosopher like Sir David Brewster.

I know, and there is comfort to us all in knowing, that even in the profession as it is, we include in our number in the metropolitan and other towns, men of cultivated minds, and occupying a high social position ; but I suspect it will be found that these are exceptional, and owe their elevation to an education far superior to the generality. It is a great matter to know and to confess our deficiencies, and there is no more effectual mode of remedying them than by joining such an association as

the Pharmaceutical Society, by free and frank interchange of opinion, and by each throwing his mite of information into the general treasury.

The paper was much applauded, and a vote of thanks, proposed by Mr. Robertson, and seconded by Mr. Smith, of St. Andrews, was carried with acclamation.

Mr. Mackay then read an interesting communication on

COMMERCIAL OTTO OR ATTAR OF ROSES.

In the introductory part of the paper he glanced at the various recognized modes of producing this article in the East Indies, China, Persia, Damascus, Asia Minor, and Adrianople. He stated that although the chief supplies both of commercial and virgin otto were sent from Constantinople and Smyrna into England, there was little or none made in either of these places. The principal place of manufacture he understood to be the neighbourhood of Adrianople, where the *genuine* or virgin otto was put into circular drums or vases, and after being stitched up in thick felt jackets were sent to the capital of Turkey, where a system of adulteration took place, by mixing the genuine article with geranium, scentless sandal wood, or some other objectionable oil. After this adulteration it was filled into Turkish otto bottles, and sent home here as *good* or *bad commercial* otto, according to the amount of adulteration practised. The tins were also sent home intact, and hence the reason why the *best otto* was to be had *not* in original Turkish bottles, but in separate ounces or pounds, under the term *virgin.*

He then referred to the difficulty of detecting the precise quantity of geranium oil added to otto. The test given was to mix the otto with pure concentrated sulphuric acid, but this did not answer the purpose. He submitted several samples of various priced ottos under the influence of sulphuric acid, and it was observed that two of the most costly, one being 26*s.* 6*d.* and the other 28*s.* per ounce in London, were affected in colour by the acid. The ordinary commercial otto certainly showed a deeper tinge of colour, but what was somewhat remarkable, the oil of geranium itself, some of which he also showed under the influence of the test, was no deeper in colour than commercial otto, at present worth from 17*s.* to 20*s.* per ounce. While, however, the acid thus failed in showing either the fact or the quantity of geranium oil as an adulterating medium in the case of commercial otto, there was a decided evidence given of the presence of sandal wood oil by the addition of sulphuric acid, which he proved by submitting a specimen of otto, which contained nearly a half of sandal wood oil, as well as by the action of the acid upon the oil itself. In the former case the colour changed rapidly and became very dark, while in the latter the effect was to produce instantly an almost complete dark brown colour approaching to black. This, he thought, showed that, along with the peculiar odour emitted, the presence of sandal oil could be easily distinguished.

In referring to the uses to which otto was put, and speaking of the large demand for this article among perfumers, he gave a very graphic account of a personal visit he had made to the manufactory of Jean Marie Farina, at Cologne, on the Rhine.

He concluded his remarks by stating his conviction that the best and truest test for the quality of this article lay in its peculiar fragrance, and if there be added to this respectability of merchant, congelation, and price, he thought a more genuine article might be got, than testing by the acid process. This opinion he gave, because though the acid test answers a certain purpose, so far as *depth* of colour is concerned, it only does so in cases which would be more easily detected by the organ of smell, or, in other words, the distinctive red colour will only be given when the adulterating oil is in such quantities as to be easily distinguishable, and thus to rank it under the name of *Commercial Otto*, but certainly not having any pretension to be recognized as *Pure Virgin Otto.*

A vote of thanks was awarded unanimously to Mr. Mackay for his paper.

There were then produced specimens of the various submarine telegraph cables, which the meeting viewed with interest.

Several specimens were presented to the Museum, and the meeting adjourned.

CHEMICAL DISCUSSION ASSOCIATION OF THE PHARMACEUTICAL SOCIETY.

The First Anniversary Meeting of the Chemical Discussion Association was held at 17, Bloomsbury Square, on Wednesday, the 12th of January,

DR. T. REDWOOD, PRESIDENT, IN THE CHAIR.

The following Report of the Committee was read:—

The Committee of the Chemical Discussion Society, in presenting their first report, beg to congratulate the Members on the success which has attended the establishment of this Association for promoting among the junior Members of the Pharmaceutical Society the extension of their studies and researches in Chemistry and the allied sciences. Permission has been obtained from the Council of the Pharmaceutical Society to hold our meetings in their rooms, and also to use their name in connexion with our own, subject, however, to certain alterations being made in some of our rules. It is further suggested that we should select some other appellation than that of "Society." The Committee therefore recommend, that the following alterations be made in the rules, and that the title of "Chemical Discussion Association of the Pharmaceutical Society," be adopted. (The alterations are embodied in the amended rules appended hereto.)

Only two ordinary meetings have been held since the establishment of the Society, which, however, have been well attended, and on those occasions several interesting subjects were brought forward. As the future success of the Society will depend upon the manner in which the meetings are supported, the Committee would take this opportunity of reminding the Members that the communications suitable for our meetings need not be in a finished state when presented, as one of the objects which the Society has in view, is for the Members mutually to assist each other in the working out of subjects, which may be thus prepared and rendered fit for publication or presentation elsewhere. They would therefore suggest, that whenever any unexplained or interesting phenomena present themselves in the course of experiments, or of the ordinary chemical and pharmaceutical operations in which the Members may be engaged, including peculiar reactions which frequently occur in the making up of prescriptions, or whenever any new instances of impurity or adulteration are met with, these will form suitable subjects to be discussed and investigated, and may, with that view, be brought before the meetings of the Association from time to time, until the investigation is considered to have been carried to a sufficient extent. Members are also invited to bring forward, and to illustrate and explain in such manner as to render them as interesting as possible, the subjects of papers which are published in the scientific journals. It is proposed in this way to extend among the Members of the Association the knowledge of the daily progress which is made in Chemistry and the allied sciences.

It was proposed by Mr. Braithwaite, seconded by Mr. Schweitzer, and resolved:—

"That the Report of the Committee be adopted, and that the alterations in the rules and the change of name, as suggested in the Report, be affirmed by this meeting."

"That Messrs. Allchin, Attfield, Barret, and Barnes, be elected Members of Committee, in place of Messrs. Allchin, Attfield, Barret, and Williams."

Officers for 1859.—*President:* T. Redwood, Ph.D. *Treasurer:* S. Gale, 338, Oxford Street. *Secretary:* C. H. Wood, 17, Bloomsbury Square. *Committee:* A. Allchin, J. Attfield, J. B. Barnes, E. Barret, J. C. Braithwaite, J. Schweitzer.

Meetings of the Association will be held on the first Monday in the months of February, March, April, May, June, and July. To commence at half-past Eight.

Constitution.—The Chemical Discussion Association has been established for the purpose of promoting the study of Chemistry and the Allied Sciences among the younger Members of the Pharmaceutical profession, by affording opportunities for the discussion of subjects to be introduced at periodical meetings, by the reading of papers, or by verbal communications, and tending to the mutual scientific improvement of the Members.

Rules.—I. The management of the Association shall devolve upon a Committee of eight Members, four of whom shall retire annually, but shall be eligible for re-election. Three shall be a quorum. The Committee shall fill up vacancies that may occur in its number.

II. The Professor of Chemistry and Pharmacy of the Pharmaceutical Society shall be *ex officio* the President of the Association. The Committee shall elect from

among themselves a Treasurer and Secretary, who shall remain *ex officio* Members of the Committee.

III. In the absence of the President, one of the Committee shall take the chair. Upon all questions of order the decision of the Chairman shall be final. Members of the Council of the Pharmaceutical Society shall have the right of attending the meetings of this Association.

IV. No paper shall be read, nor any subject introduced at the Meetings, against the wish of the Committee.

V. The ordinary proceedings of the Association shall not be published in any journal, but the Annual and other Reports of the Committee may be so published.

VI. Copies of papers read at the Meetings shall be given into the charge of the Secretary, to be kept for reference ; but the Association shall exercise no right over such papers or communications.

VII. Every Candidate for admission into the Association shall be proposed by a Member at an Ordinary Meeting, and at the following Meeting shall be balloted for. A majority of votes to decide. After he has been elected he shall sign the following obligation, to be kept by the Secretary, and pay his subscription for the current year, upon which he shall be admitted a Member of the Association.

Obligation.—I, the undersigned, having been elected a Member of the Chemical Discussion Association, do hereby engage to abide by the Rules and support the Constitution of the said Association, so long as I continue a Member thereof.

VIII. Every Member shall pay an annual subscription of five shillings, such subscription becoming due on the first day of January in each year.

IX. In the case of Members who shall be elected after the month of October, and who shall have paid their subscription, such subscription shall count for the year next ensuing.

X. Persons not belonging to the Pharmaceutical Society, but whose co-operation would be valuable to the Association, shall be eligible as Members ; but the election of such shall be subject to the approval of the Council of the Pharmaceutical Society.

XI. Any Member desiring to withdraw from the Association, shall signify the same in writing to the Secretary. Any Member whose subscription is in arrear for three years, may be removed by the Committee from the list of Members.

XII. To expel any Member from the Association for other cause than non-payment of subscription, it shall be necessary for the Committee to summon a Special General Meeting, of which one month's notice shall be given to every Member of the Association ; and the proposition for such expulsion being made at such Meeting, and submitted to a ballot, if three-fourths of the Members assembled vote in the affirmative, the proposition shall be carried.

XIII. A Meeting of Members shall be summoned annually in the month of January, to receive the Report of the Committee and the Treasurer's accounts, and to elect four Members of Committee for the ensuing year. The election shall be by ballot. Members of the late Committee shall be eligible for re-election.

XIV. At the ordinary Meeting in the month of December, two Members not belonging to the Committee shall be appointed Auditors, to examine the Treasurer's accounts for the Annual Meeting.

XV. The foregoing Rules of the Society shall not be altered or increased without the sanction of a Special General Meeting of the Members, nor without the sanction of the Council of the Pharmaceutical Society. The Committee may, however, make such minutes for carrying out the objects of the Association as may from time to time be found necessary.

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

The Fifth Meeting of the Session was held in the Royal Institution, Dec. 23rd,

MR. H. S. EVANS IN THE CHAIR.

Mr. Edward Davies was elected a Member.

The Secretary announced the following Donations to the Library and Museum:—

The Transactions of the Historic Society for the year 1858, from the Society. A specimen of the "Go Go" Bark of *Mimosæ abstergens*, from Manilla, used by ladies as a detergent for washing the hair, from Prof. Archer.

Prof. Archer exhibited the cotyledons of seed and withered flowers of *Bosea latifolia*, the Mahwa plant of the East Indies, from which an expressed oil or butter is obtained. The flowers have the appearance of raisins, and contain large quantities of starch and sugar, and are used for making spirit.

Prof. Archer then delivered the lecture of the evening, on the "Useful Products of the Natural Order Umbelliferæ."

Thanks having been voted to the lecturer, the proceedings terminated.

Royal Institution.

The Sixth Meeting of the Session was held on Thursday, the 20th of January,

THE PRESIDENT IN THE CHAIR.

Messrs. Swinburne and Crossley were elected Members, and Mr. R. J. Johnson an Associate.

The following donations to the Library and Museum were announced by the Secretary :—Two copies of a *Report on Vegetable Parchment*, by Mr. A. W. Hofmann, from Mr. Ellerbeck. Three specimens of asafœtida, from Mr. Dyce Duckworth. Potassio-tartrate of iron, from Mr. J. C. Braithwaite. Three shells containing scammony, from Sidney H. Maltass, Esq., of Smyrna. Tonquin beans, with and without the husk, from Mr. Holt. Oil from the seed of the cotton plant:—soap made from the same oil:—cake after the oil has been expressed, from Mr. T. R. Arnott. Six specimens, consisting of Rangoon earth oil with its derivatives, paraffine, Sherwood oil, Belmontine oil, for burning, and a lubricating oil, &c., all of which are coming into extensive demand, from G. F. Wilson, Esq., the managing director of Price's Patent Candle Company. Bone superphosphate and coprolite superphosphate, from Mr. N. Samuelson.

Mr. Newton Samuelson, F.C.S., then read his paper on

BONES AND BONE MANURE:

Its Preparation, Modes of Application to the Soil, Analysis, and Detection of Adulteration.

The lecturer commenced by giving a short history of bones as a fertilizer, remarking that they were first employed in Germany for that purpose, and afterwards introduced into England in the year 1771. In the beginning, their employment as a manure had many difficulties to contend with, which have gradually been overcome, and within the last ten years their use had been greatly increased.

He then explained the proportions in which organic and inorganic substances are found in the bones of various animals and fishes, and stated that bones sometimes differed materially as to their value in agriculture, in consequence of the amount of phosphoric acid they contained, varying with the age and species of the animal.

He next considered the fertilizing properties of bones, and explained minutely how both portions of the bone acted upon the soil and plants, and then entered into the means employed for increasing their sensible effect upon the soil, which he said might be attained by three different ways:—1st, by reducing them to powder; 2ndly, by heating them; and 3rdly, by fermenting them with dung. And after explaining these processes, Mr. Samuelson proceeded to consider the second part of his discourse, namely, Dissolved Bones, or Superphosphate of Lime. In this portion of the paper he described accurately the various methods which were published for the preparation of this article, observing that every manufacturer employed a peculiar process of his own, stating, however, that it was absolutely necessary to have the bones either first finely pulverized, or heated with high pressure steam, until they become perfectly soft, before acting upon them with sulphuric acid; and after having also alluded to the manufacture of superphosphate from coprolites, he pointed out the various soils and crops to which vitriolized bones were peculiarly adapted.

The adulteration of superphosphate next engaged his attention, remarking that the sophistication of guano and artificial manures was easily effected and too often perpetrated, causing serious losses to the farmers, as impure manures had a pernicious effect upon the soil and crops. In bone dust he observed that there were

unfortunately no certain methods known for the farmer to detect these adulterations himself, and that it was only by an accurate chemical analysis that such frauds could be detected and made public; and therefore recommended the farmer to exercise great caution in purchasing his manures, which should, if possible, only be bought from old-established and high reputed manufacturers, and when he had the slightest cause to suspect that a sophisticated article had been palmed upon him, that he should immediately bring the functions of chemical science to his aid, and have the adulteration detected.

The concluding portion of the paper was occupied with describing minutely the principal methods which were generally employed by Chemists for analyzing bone dust and bone manure, pointing out at the same time to the audience how much interesting as well as practical information might be obtained and imparted by the perusal of a few works on chemistry and agriculture. The lecture was attentively listened to; and after a brief discussion, a vote of thanks was accorded to Mr. Samuelson for his highly instructive and practical paper.

After which, a paper was read "On the Narthex Assafœtida: a Description of the Plant, its Properties and Uses," by Mr. Dyce Duckworth; which will appear in our next number.

ORIGINAL AND EXTRACTED ARTICLES.

ON ARSENICAL PAPER HANGINGS,

And the mode in which they produce noxious effects on Health.

BY ALFRED S. TAYLOR, M.D., F.R.S.

A FRIEND, whose library walls were covered with an arsenical paper, had suffered for some time from chronic inflammation of the eyes, especially affecting the conjunctivæ of the eyelids. On the discovery that arsenic was contained in the green pigment of this paper in rather large quantity, he caused it to be removed during the summer, and to be replaced by another, containing no arsenic. The inflammation from which he had suffered disappeared; but, within the last few weeks it has returned. He informed me that he had been dusting some books in a bookcase in this room, and he supposed that the dust which had accumulated for two or three years had affected his eyes, and had caused a return of the inflammation. Some of the dust was carefully removed on the 21st December from the tops of a few books by a feather, and submitted to a chemical analysis. The dust weighed one grain and a half; it had an olive-green colour, and, under the microscope, it presented the appearance of fibres with numerous particles of various colours, chiefly of a greyish black. Treated by Reinsch's process, a portion of this dust yielded a deposit of arsenic, and there was therefore clear evidence that some of the arsenical pigment formerly on the walls had found its way through the glass-doors of the bookcase, and was deposited in the form of a fine dust on the tops of the books.

On the 23rd December, after having made this chemical examination of the dust from a private dwelling, I procured from the shop of Messrs. Marratt and Short, Opticians, 63, King William Street, London Bridge, a quantity of dust for the purposes of analysis. The walls of this shop are covered with an unglazed arsenical paper, and, as I am informed, they have been so covered for a period of three years. In collecting this dust from the tops of the instrument cases, great care was taken not to touch the walls. The quantity thus collected for examination amounted to about 450 grains. It was nearly black, and, under the microscope, it appeared to consist of fibres and sooty particles. It was very light and flocculent. 150 grains of this dust were examined by Reinsch's process, and enough metallic arsenic was obtained from this quantity to coat about ten square inches of copper-foil, in addition to a piece of copper-gauze. From the deposit on the latter, by the application of heat, octahedral crystals of arsenic were readily obtained. The cases had not been dusted for a period of nine months.

The instrument cases are secured by glass-doors, and they are lined inside at the back with arsenical paper. A small quantity of dust was removed by a camel's hair pencil from the projecting portions of the thermometers and barometers which are kept there. The quantity thus obtained weighed about eight-tenths of a grain, of which five-tenths were taken for examination. This half grain of dust sufficed to cover with metallic arsenic a square inch of copper gauze. A portion of this, when heated, yielded a large number of well-defined octahedral crystals of arsenious acid.

These facts lead to the inference that the air of a room, of which the walls are covered with an *unglazed* arsenical paper, is liable to be charged with the fine dust of the poisonous aceto-arsenite of copper. Those who inhabit these rooms are exposed to the risk of breathing this dust. The poison may thus find its way, either by the pulmonary membrane into the system, or it may affect the eyes, nose, and throat by local action. That but few cases of actual poisoning under these circumstances have occurred, is a fortunate circumstance; but cases involving serious symptoms only would be likely to attract attention. There may have been numerous instances of a disturbance of health depending on this arsenical paper, which, from absence of suspicion, has been referred to other causes. The degree of exposure—the state of health—peculiar susceptibility and the eliminating power of the system—may account for the comparative rareness of these cases. The mode in which the pigment is laid on the paper may be such as to prevent in some instances the escape of the fine particles of dust. The fact, however, now demonstrated, that arsenical dust is breathed by those who occupy rooms thus papered, explains the similarity of symptoms observed, justifies the statements made by Dr. Hinds, Dr. Halley, and others, and proves that those who have experimented on this subject with negative results, have not taken the right course to arrive at the truth. Their results have to a certain extent misled the public by teaching them to rely on what is now proved to be a false security. If, as a general rule, the quantity of arsenic which can penetrate the body from this source is very small, it is still desirable that arsenic should not be breathed day by day in any proportion. The defenders of this noxious manufacture will hardly go to the length of asserting that this arsenical green, which is a potent poison in the stomach, can exert no injurious effect when taken into the lungs, and yet unless this assumption be made, the inevitable inference is that these papers should not be used for covering the walls of our dwellings.

15, *St. James's Terrace, Regent's Park, December* 26, 1858.

Since the above was written, I have discovered arsenic in the dust taken from the cornices in a dining-room lined with arsenical paper, as well as in dust removed from the gilt mouldings of picture-frames in a hall, the walls of which were covered with arsenical paper. Mr. Gay, of Finsbury Place, sent me a few grains of dust from a room in which he habitually sat, which was lined with a green paper. The dust was flocculent, and of a green colour. It contained decided traces of arsenic. He informed me that since his return from a summer residence in the country, he had found his health very indifferent, and had not been able satisfactorily to account for it. He had suffered from colicky pains from time to time, and occasionally they had been very severe. His eyes (the conjunctivæ) were inflamed, and felt uncomfortable. Latterly he had had a severe cough, attended with *hoarseness*, and almost entire loss of voice.

It is quite true that in numerous cases in which arsenical papers have been used, persons inhabiting such rooms have not suffered or appeared to suffer from any unpleasant symptoms. This, however, is no reason why we should wilfully make an arsenical atmosphere in our sitting and bedrooms. It is not intended that arsenic in any form, in however small a quantity, should be a constituent part of the air we daily breathe, and the fact that we have before us a pleasant green colour, affords no compensation for the risk which may be incurred. Sanitary reformers object to an atmosphere containing 1-2000th or even 1-10,000th

part of sulphuretted hydrogen gas; but there are numerous instances in which it is breathed with impunity, and although no medical man would advise a person to live in such an atmosphere, yet it is most difficult to produce well-marked cases of illness which can be conclusively assigned to the effects of this gas. We should not knowingly contaminate the air we breathe with any poison, whether in the shape of fine dust, gas, or vapour, and it appears to me that this rule should be most strictly observed with reference to a poison like arsenic.

There are two parties who are reluctant to admit these conclusions:—1st, the arsenical paper manufacturers—and 2nd, those who have papered their rooms with arsenical paper-hangings, and who, so far as they know, have not suffered any injurious effects. With respect to the first, let them turn their attention to the manufacture of a green paper free from arsenic; and with regard to the second, it may be said, *quod forsan fieri non debet, factum valet.* If they really can breathe arsenical dust with impunity, they may consider themselves as most fortunately constituted, and rejoice in a state of health which even arsenic received through the lungs cannot disturb. Still it must be remembered all men are not constituted alike. There are many who can live and enjoy comparative health within reach of the effluvia of cesspools and sewers; but the same impunity does not extend to all. It is enough to know that a poisonous material which cannot improve our health, and may really injure it, is present in the air of a sitting or bedroom. The most common sanitary precautions would in such a case justify its removal.

January 7th, 1859.

REPORT OF THE

RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION,

AND OF THE

APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

BY B. H. PAUL, Ph.D.

(*Continued from p.* 334.)

Annual Yield of Nitrogen per Acre in different Crops.—The question of the assimilation of free nitrogen by plants, and some allied points, have recently been investigated by Mr. Lawes and Dr. Gilbert,* and, in a paper read last year, it was stated in general terms that the amount of nitrogen yielded per acre per annum in different crops, even when unmanured, was considerably beyond that annually coming down, in the forms of ammonia and nitric acid, in the yet measured and analyzed aqueous deposits from the atmosphere. The investigations then referred to were still in progress; and a desirable introduction to the record of the results would obviously be, to illustrate by reference to direct experiment that which had been before only assumed regarding the yield of nitrogen in our different crops. To this end had been determined the annual produce of nitrogen per acre in the case of various crops, which were respectively grown for many years consecutively on the same land—namely, wheat fourteen years, barley six years, meadow hay three years, clover three years out of four, beans eleven years, and turnips eight years. In the majority of the instances referred to, the yield of nitrogen had been estimated both for the crop grown without manure of any kind, and for that with purely mineral manure—that is, excluding any artificial supply of nitrogen. It was the object of the present communication to give a summary view of some of the facts thus brought to light.

Beans and clover were shown to yield several times as much nitrogen per acre as wheat or barley. Yet the growth of the leguminous crops, *carrying off* so much nitrogen as they did, was still one of the best preparations for the growth of wheat; whilst *fallow* (an important effect of which was the accumulation within the soil of the available nitrogen of two years into one) and *adding nitrogenous manures* had each much the same effect in increasing the produce of the cereal crops.

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* Paper read at the meeting of the British Association for the Advancement of Science, Leeds, Section B., Sept. 28, 1858.

Other experimental results were adduced, which illustrated the fact, that four years of wheat, alternated with *fallow*, had given as much nitrogen in the eight years as eight crops of wheat grown consecutively. Again, four crops of wheat grown in alternation with *beans* had given nearly the same amount of nitrogen per acre as the four crops grown in alternation with fallow; consequently, much about the same as the eight crops of wheat grown consecutively. In the case of the alternation with *beans*, therefore, the whole of the nitrogen obtained in the beans themselves was over and above that which was obtained during the same series of years in wheat alone, whether it was grown consecutively or in alternation with fallow.

Interesting questions arose, therefore, as to the varying sources or powers of accumulation of nitrogen, in the case of crops so characteristically differing from one another as those above referred to.

It had been found that the leguminous crops, which yielded in their produce such a comparatively large amount of nitrogen over a given area of land, were not specially benefited by the direct application of the more purely nitrogenous manures. The cereal crops, on the other hand, whose acreage yield of nitrogen under equal circumstances was comparatively so small, were very much increased by the use of direct nitrogenous manures. But it was found that, over a series of years, only about $\frac{4}{10}$ths of the nitrogen annually supplied in manure for wheat or barley (in the form of ammonia-salts or nitrates) were recovered in the immediate increase of crop. Was any considerable proportion of the unrecovered amount drained away and lost? Was the supplied nitrogenous compound transformed in the soil, and nitrogen in some form evaporated? Did a portion remain in some fixed and unavailable state of combination in the soil? Was ammonia, or free nitrogen, given off during the growth of the plant? Or, how far was there an unfavourable distribution and state of combination, within the soil, of the nitrogenous matters applied directly for the cereal crops—those, such as the leguminous crops, which assimilated so much more, gathering with greater facility and from different ranges of soil, and leaving a sufficient available nitrogenous residue within the range of collection of a succeeding cereal crop? These questions, among others which their solution more or less involved, required further elucidation before some of the most prominent of agricultural facts could be satisfactorily explained.

Comparing the amount of nitrogen yielded in the different crops, when grown without nitrogenous manures as above referred to, with the amount falling in the measured aqueous deposits, as ammonia and nitric acid, it appeared, taking the average results of the analysis of three years' rain, that all the crops yielded considerably more, and some very much more, than so came down to the soil. The same was the case when several of the crops had been grown in an ordinary rotation with one another, but without manure, through two or three successive courses. Was this observed excess in the yield over the yet measured sources at all materially due merely to exhaustion of previously accumulated nitrogenous compounds within the soil? Was it probably attributable chiefly to the absorption of ammonia or nitric acid from the air by the plant itself or by the soil? Was there any notable *formation* of ammonia or nitric acid from the free nitrogen of the atmosphere? or did plants generally, or some in particular, assimilate this free nitrogen?

As already intimated, some of the points which had been alluded to were at the present time under investigation; others, it might be hoped, would receive elucidation in the course of time. Of course, there still remained the wider questions, of the original source and of the distribution and circulation of *combined nitrogen* in the soil, in animal and vegetable life on the earth's surface, and in the atmosphere above it.

Preparation of Aluminium.—M. Corbelli, of Florence, has obtained a patent* for a method of preparing this metal by electrolysis of chloride or other soluble salt of aluminium. For this purpose the solution is placed in a vessel composed of a material which is a non-conductor of electricity, and a quantity of mercury, in a fluid state, having been placed in the vessel, a weak current of electricity is to be passed through the mercury and the liquid, for which purpose an insulated iron wire is introduced into the vessel, and brought into contact with the mercury at the bottom of the vessel. This iron wire is connected with the positive pole of a galvanic

* Specification, No. 507, 1858.

battery, the negative pole of which communicates with a plate of zinc immersed in the liquid, but suspended so as not to touch the mercury. A galvanic action being now set up, the salts of alumina will be decomposed, and the aluminium will be deposited upon the zinc plate, either in the form of a blackish powder or in a thin compact sheet. During this operation the chlorine will be set at liberty, and, having a great affinity for mercury, it will combine with that metal, and form therewith protochloride of mercury (commonly known in commerce as calomel), which will be found deposited on the surface of the mercury at the bottom of the vessel.

Preparation of Stearine.—Mr. Hart* has obtained a patent for a method of preparing stearine, which consists in saponifying palm-oil in the usual manner; then washing the fat and mixing it with one-tenth of cocoa-nut-oil, in an iron pan, in which the whole is boiled. When the mixture has attained a temperature of about 260° Fah., there is added thereto, for every gallon of the mixture, eight quarts of fresh milk, mixed with 4 lbs. of rosin. The fatty compound is then kept well stirred by an agitator for about half an hour, after which the steam is shut off, and the fatty matter is transferred to wooden vessels, and left for about twelve hours to settle. In the next place, it is put into a pan and heated to about 160° Fah., and is then run on to a hollow plate heated by steam, whence it passes to a chamber, in which it is subjected to an atmosphere of nitrogen gas and heated air. This chamber is made rectangular, and by preference, of plates of iron enamelled, or lined with copper, so as to prevent the fatty matters from being discoloured by contact with the metal. The chamber is surrounded by a steam jacket, and fitted with inclined plates, by preference of glass, which are set one above another, and at suitable angles, to receive the fluid fatty matter as it is discharged into the closed chamber through a perforated pipe, and transmit it in a thin film from one to the other of the inclined surfaces, while it flows downwards by its own specific gravity. A pipe at the bottom of the chamber is provided for drawing off the fluid fatty matter. The heat of this chamber should be maintained to about 400° Fah.; and as the fatty matter is supplied to the inclined plates, heated air and free nitrogen are to be forced into the chamber. By the fatty matter being thus exposed to the action of the heated air and nitrogen over an extended surface, and while slowly flowing through the chamber, the chemical separation of the stearine from the oleine will be facilitated or effected. The material under treatment (still in a fluid state) is run out of the chamber into cooling vessels provided for the purpose. These vessels are, by preference, to be boxes packed with ice, the ice being covered by glass plates, on to which the fluid fatty matter falls, and thus becomes quickly solidified. The solidified mass is next to be subjected to pressure, in the usual way, to effect the mechanical separation of the stearine, and the operation is completed.

Amount of Caffein in Coffee Berries.—Dr. A. Vogel† recommends the use of benzol for the purpose of extracting caffein from the berries. This substance dissolves both the caffein and the oil contained in the berries, but when the solution is evaporated to dryness and the residue is mixed with hot water, the caffein alone is dissolved, and, after the separation of the oil that floats on its surface, may be obtained as fine crystals by evaporating the solution.

Indigo, a reagent for the Detection of Grape and Fruit Sugar.‡—Both grape sugar and fruit sugar are capable of discharging the colour of indigo in the presence of alkalies, even at the ordinary temperature, but more rapidly when the mixture is warmed. This reaction takes place with alcoholic solutions as well as with water solutions. When a solution of indigo in sulphuric acid is employed, the smallest traces of grape or fruit sugar may be detected. At the same time the liquid to which the test is applied must, during the whole experiment, have an alkaline reaction, in order to obtain a trustworthy result. The solution of indigo is not only easily altered, but the indigo is also oxidized, and it is either wholly or partially decomposed by caustic soda or potash. In the former case, the liquid acquires a yellow colour, and becomes blue again when neutralized with an acid, or if it has not been previously heated, a green colour that is not altered even by moderate boiling. But

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* Specification, No. 495, 1858.
† *Kunst u. Gewerbeblatt für Bayern.*, 1858.
‡ Dr. E. Mulder—*Archiv der Pharmacie*, September, 1858.

when an excess of carbonate of potash or soda is added to the solution of indigo the blue colour remains almost unaltered, even after boiling the liquid.

Both the green and blue solutions give an extremely delicate reaction with grape and fruit sugar. The former is the most sensitive, but the latter is nevertheless preferable. In testing for grape sugar it is not essential to make use of very easily decomposable substances. Moreover, the fitness of the blue solution as a test for grape sugar is shown by the fact that even when long boiled with cane sugar it does not decompose it, although the instant a mere trace of grape sugar is introduced into the liquid, the characteristic reaction is produced. On the contrary, the green solution is decomposed by cane sugar.

The decomposition of a solution of indigo by means of grape or fruit sugar, when rendered alkaline by carbonated or caustic alkalies, presents several remarkable features. In the first place, sulphindigotate of potash and hyposulphindigotate of potash are produced. The former is not soluble, at the ordinary temperature, in a solution of either sulphate or carbonate of potash, but it is partially dissolved when the liquid is warmed, or is at least so diffused through the liquid that it is almost in the state of solution. On the contrary, the hyposulphindigotate of potash remains wholly dissolved, and may be separated from the sulphindigotate by filtration.

If an alkaline solution of indigo is required the latter must be used. In this case it is desirable to use, instead of English acid, the fuming sulphuric acid, which produces hyposulphindigotic acid, but this is not by any means essential, since both the indigo salts are almost equally sensitive reagents for grape and fruit sugar.

The test liquid will therefore contain hyposulphindigotate of potash in solution, and sulphindigotate diffused through it. Some of this is put into a test tube, with as much water as may be requisite to reduce the colour to a pale blue, and then it is boiled. The colour remains unaltered, but when a very minute quantity of a water solution of grape or fruit sugar is added to the boiled liquid the colour gradually passes from blue to green, and reddish purple. With a larger quantity of sugar the reddish purple colour gradually becomes red and then yellow. By shaking the liquid it again becomes blue or green, and the same change takes place from the surface of the liquid downwards, when it is left exposed to the air.

Guided by the opinion that there is an intimate connexion between the several coloured products of decomposition, which Berzelius obtained from sulphindigotate of potash by the action of lime water, and those produced in the above described reaction with sugar, Hr. Mulder has succeeded in ascertaining that this is really the case. Sulphindigotate of potash may be boiled with carbonate of potash, without the colour being sensibly altered at first, but by long-continued boiling the liquid gradually becomes yellow, as when sugar is present. The yellow substance is a product of the decomposition of the indigo, and indeed the same that Berzelius obtained by the action of lime water upon sulphindigotate of potash, or flavin-sulphuric acid. There is yet another product of decomposition, which has a red colour—the rufin-sulphuric acid of Berzelius—and the red colour appears before the yellow colour, so that the one is produced from the other.

Applying these facts to the testing for sugar, it appears that when the blue solution is boiled, there will be produced by the action of the carbonate of potash on the indigo, a red, and probably to some extent a yellow substance, but at the same time the colour of the liquid will be but very slightly altered, because these substances are produced in very minute proportions. Then on adding to the liquid grape sugar, the blue indigo is converted into white indigo, and the red colour becomes apparent. Therefore this red colour has nothing to do with the sugar reactions.

When the liquid in this condition is shaken, the white indigo is again converted into blue indigo, and the original colour of the liquid is little altered. On repeating the test, a yellow liquid is obtained, because the red substance has been converted into the yellow one. When the liquid is again shaken it acquires a red and bluish-green colour, while the blue indigo produced by the oxidation of white indigo is converted into the red substance by carbonate of potash.

Consequently the liquid must have a green colour, for the yellow product remains unaltered in colour, and it, together with blue, produces a green colour, the red substance having been converted into a yellow one.

Composition of the Precipitate produced by Cyanide of Potassium in Solutions of Protosalts of Iron.—In the year 1842, it was pointed out by Haidlen

and Fresenius that the yellowish red flocculent precipitate produced when solution of cyanide of potassium is mixed with protosalts of iron, requires a large quantity of cyanide of potassium for its solution, but that it is readily dissolved and converted into ferrocyanide of potassium by means of caustic potash. Hence Gmelin conjectured that this precipitate might be the protocyanide of iron —Fe C_2 N.

Professor Fresenius* has recently continued the investigation of this point, and finds that the precipitate in question consists in part of protocyanide of iron Fe Cy, but that it is always mixed with cyanide of potassium in very various proportions.

This substance when precipitated in an atmosphere of hydrogen, and at a temperature of 32° F., appears at first red, and afterwards becomes orange yellow. When it is precipitated from a lukewarm solution, it has a pale yellow colour. When treated with cyanide of potassium solution, while in the hydrogen atmosphere scarcely any solution takes place in the cold, but it is dissolved on the application of heat, and when there are at least two equivalents of cyanide of potassium for each equivalent of cyanide of iron. On the addition of caustic potash the precipitate dissolves more readily, and the solution contains ferrocyanide of potassium.

The precipitate, after having been washed in an atmosphere of hydrogen, rapidly acquires a fine blue colour when exposed to the air. In this altered state it consists of ferrocyanide of iron with hydrated peroxide of iron, and still contains potassium. The change may be represented by the equation :

$$9\ Fe\ Cy + 3\ O = Fe_2\ O_3 + Fe_7\ Cy_9 = Fe_2\ O_3 + Fe_4\ Cfy_3$$

By treatment with caustic potash while air is excluded, this substance is converted into ferrocyanide of potassium and hydrated protoxide of iron :

$$3\ Fe\ Cy + 2\ KO = 2\ Fe\ O + Cy_3\ Fe,\ 2\ K.$$

The precipitate also becomes blue when treated with dilute sulphuric acid while air is excluded.

Heteromorphous Conditions of Carbonate of Lime.—The researches of Professor G. Rose† in connexion with this subject relate chiefly to the calcareous deposits of the *mollusca*, and they show that the carbonate of lime constituting shells consists sometimes of arragonite and calc-spar, sometimes of calc-spar, and sometimes of arragonite alone.

The former case obtains with the shells of the genus *pinna perua* and *inoceramus*. These consist of two superimposed layers, the outer fibrous layer consisting of calc-spar, and the inner mother-of-pearl layer consisting of arragonite. The fibrous layer in *pinna nigrina* consists of perpendicular pentagonal or hexagonal organic cells in which calc-spar is deposited, in such sort that each cell is occupied by one individual, whose principal axis is parallel with that of the cell, but whose secondary axes have a different direction in each cell. This is apparent from the fact that the rhombohedral cleavage planes, which may be clearly recognized in the transverse fraction of the shells when they are at all thick, always have a different position; and it is also still more apparent from the fact, that when thin plates of the shell, cut at right angles to the axes of the cells, are polished and submitted to hydrochloric acid, there is found, by the aid of the microscope, a number of rhombohedral depressions which are parallel with each other, while in each, in the different cells, they have a different situation. When the plates are too thick to be transparent, an isinglass cast must be made, as directed by Leydolt, before this peculiarity of structure becomes apparent. In the fossil *inoceramus* from the planer limestone of Strehlen, or that from the chalk of Meudon, the rhombohedric cleavage planes are still better recognizable at the fracture of the shell, because the calc-spar crystals are larger. However, in these fossil shells the organic cells have been destroyed, and in their place are small microscopic calc-spar crystals, which are at right angles to the original cell walls.

The density of the *inoceramus* of Strehlen was 2.744, rather more than that of pure calc-spar, which is 2.72, and this is owing to the circumstance that, although fossilized, there is still some organic substance present.

The inner mother-of-pearl layer of *pinna* consists of extremely thin superimposed layers, consisting of arragonite. This is apparent from the fact that they present, by the aid of the microscope, hexagonal or octagonal depressions corresponding with the form of arragonite. In the shells of *pinna nigrina* such thin tabular crystals with

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* *Annalen der Chemie und Pharmacie*, cvi., 210.

† *Bericht. der Akad. der Wissens. zu Berlin*, 1858, p. 341.

measurable angles are often met with at the surface of the mother-of-pearl layers. Generally, several of them are grouped together, the upper ones being always smaller than the under ones. In the shells of *pinna seminuda*, which are quite transparent, though consisting of the two layers, the hexagonal plates on the under side of the mother-of-pearl layers are much smaller, but are everywhere recognizable.

In the genus *unio* and *anodonta* both layers also occur in the shells, but the outer one is much thinner, and consists of the adjoining bands of the envelope, while the mother-of-pearl layer extends the whole surface of the envelope, and is increased by another layer at every increase of size. In *unio verrucosus*, the mother-of-pearl layer is very thick; its density was found to be 2.909, and, like the mother-of-pearl layer of *pinna*, it scratches the cleavage surfaces of calc-spar.

The shells of the genus *ostrea* consist entirely of calc-spar; two layers are, however, distinguished, an outer cellular layer, and an inner mother-of-pearl layer; the former is more like that in the shells of the genus *unio* and is less coherent, the latter consist of layers which are again made up of irregularly superimposed bands. It is evident that both consist of calc-spar, because they do not scratch calc-spar, and from the low density—that of the fossil *o. edulis*, from strata of the most recent tertiary series at Palermo, being 2.732. The snow-white earthy mass situated at several places between the layers of mother-of-pearl in the existing *o. edulis* has a density of 2.756; but it contains also much conchiolin—according to Schlossberger, 6.27 per cent.—while the mother-of-pearl contains only from 2.2 to 0.8 per cent.

When the shells of *o. edulis* are perforated at the exterior by sponges, there is deposited opposite the spot a thin green layer, and then the mother-of-pearl is again deposited. This green layer, examined by the aid of the microscope, appears to contain a number of small sharply-defined calc-spar rhombohedrons, imbedded separately in organic substance, which completely protects them from the action of hydrochloric acid. Similar rhombohedrons, enveloped in a white skin, occur also in the cavities situated between the layers of mother-of-pearl in thick oyster-shells.

In *o. lamellosa*, the white earthy mass between the layers of mother-of-pearl is much thicker, and forms distinct layers. They appear somewhat fibrous, the fibres being perpendicular to the layers, and in the fossil *o. vesicularis*, from the chalk, they are still thicker, consisting of actual columnar calc-spar, in which the planes of cleavage inclined to the axis of the columnar masses are quite distinct.

In the genus *pecten* and *spondylus* only one layer is visible, which in its structure corresponds with the mother-of-pearl layer in *o. edulis*. It does not scratch calc-spar, and therefore seems to be calc-spar.

All the shells of the *gasteropoda* consist entirely of arragonite. There are three layers parallel to the surface, and presenting a peculiar structure. All the layers consist of thin rectangular prisms, arranged side by side in laminæ, which are situated above each other, but in such manner that the prisms in two adjoining laminæ form together an angle of 90°. These laminæ are situated in the outer and inner layers at right angles with the surface and the striæ; in the intermediate layers they are at right angles with the surface, but parallel with the striæ. This complicated structure is just as much organic as that of the fibrous layers in the *pinna*, although the *strombus gigas* contains only 0.81 per cent. conchiolin. Bournon regards the superimposed laminæ of the several layers as the cleavage planes of calc-spar, but G. Rose considers this opinion erroneous.

The shells of *strombus gigas*, like all *gasteropoda*, scratch calc-spar; and the density is 2.970. The density of a *paludina*, similar to the *p. achatina*, from the diluvial sand at Glindow, near Potsdam, was from 2.968 to 2.967.

It is remarkable that the shells of the eggs of *gasteropoda* consist of calc-spar. Turpin observed this to be the case with the eggs of *helix adspersa*, and G. Rose found it the case with the eggs of *helix pomatia*.

The shells of many bivalves also consist of arragonite. Those of the genus *pectunculus* consist of two layers, both of which scratch calc-spar. The fossil shells of the *p. pulvinatus*, from the intermediate strata of the tertiary series at Klein-Spouven, near Maestricht, were found to have a density of 2.967 and 2.962 at the inner and outer parts, and both contained some conchiolin.

The shells of *acra*, *artemis*, *cytherea*, *venus*, &c., scratch calc-spar like those of *pectunculus*, and therefore consist of arragonite.

The shells and other parts of fossil *crinoidæ* generally consist of calc-spar that has a perfect cleavage. Each stalk consists of a calc-spar crystal, the principal axis

of which coincides with the axis of the stalk. Haidinger has shown that this is also the case with the existing *echinites*, so that the fossilization consisted merely in the removal of the organic substance, and the deposition of carbonate of lime in the cavities of the calc-spar. In the fibrous layers of *pinna* the calc-spar crystals are differently situated, so that during the removal of the organic substance the carbonate of lime deposited could not combine all the crystals into a single one.

The fresh brain of rabbits is often turbid, and contains solid carbonate of lime. When it is mixed with water and filtered, and the washed deposit examined by the microscope, it has the appearance of artificially prepared arragonite.

The microscopic crystals in the milky liquid of the intervertebral cavities and skull of the frog have also the form of artificially-prepared arragonite.

The crystals in the labyrinth of *protopterus* are arragonite, and so are perhaps all otolites. The otolites of other fish—for instance, of shell-fish—are sometimes several lines in diameter, and very distinctly scratch calc-spar.

Production of Crystalline Silicates, &c., at High Temperatures.—MM. Deville and Caron* have succeeded in preparing metallic oxides, spinelle, and several silicates in a crystalline state. The methods they adopted would also be applicable in other instances.

One of the most successful was the mutual decomposition of volatile metallic fluorides, and the fixed or volatile oxygenated compounds. But since there are few of the metallic fluorides which are absolutely fixed this process is not always applicable.

White corundum was obtained very readily as fine crystals, when fluoride of aluminium was placed in a carbon crucible with a small capsule of boracic acid on the top, and the covered crucible, protected from access of air, was exposed for an hour to a white heat. The reaction between the vapours of fluoride of aluminium and boracic acid gives rise in this case to the production of fluoride of boron and alumina. The crystals have the optical and crystallographic characters of corundum, as well as the hardness and composition of native corundum.

By the same method rubies were obtained very readily, it being only necessary to mix with the fluoride of aluminium a small quantity of fluoride of chromium. The operation was conducted in a clay crucible, and the boracic acid was placed on a platinum capsule.

The blue sapphire is also coloured with chromium, and was produced in the same manner as the ruby, the only difference being in the quantity of colouring substance, and perhaps also the state of oxidation. In one experiment there were obtained red rubies, together with fine blue sapphires equal in colour to the oriental sapphire.

When the quantity of oxide of chromium was very large, a fine green corundum was obtained, like the uwarowite, which, according to Damour's analysis, contains 25 per cent. oxide of chromium. This substance was always found in that part of the apparatus where the fluoride of chromium was condensed.

By the reaction of fluoride of iron and boracic acid, magnetic oxide of iron was obtained, as long acicular crystals formed by the attachment of octahedral crystals, and terminating with small octahedrons. Hence it appears that peroxide of iron is partially reduced at a high temperature.

Zircon was obtained as small regular groups of crystals, and as dendritic forms like chloride of ammonium, in the same manner as corundum. It was perfectly insoluble in all acids, even concentrated sulphuric acid. Melted potash had no action upon it, and it could only be decomposed by fusion with bisulphate of potash.

Other crystalline metallic oxides have been obtained in a similar manner with the fluorides of uranium, titanium, and tin.

With equal equivalents of fluoride of aluminium and fluoride of glucinum, crystals were obtained by reaction with boracic acid, quite similar to those of cymophane or chrysoberyll from America.

In the preparation of gahnite the mixture of fluoride of aluminium and fluoride of zinc must be put into an iron vessel, and the boracic acid into a platinum capsule. The substance was obtained as shining regular octahedrons, but much coloured, probably by the iron of the crucible.

Silicates may be prepared as well developed but small crystals, by the reaction of silica with the vapour of volatile fluorides. A crystalline substance was then obtained

* *Comptes Rendus*, xlvi., 764.

having the appearance and composition of staurolite, and presenting its essential characters.

The same substance was obtained very readily by heating alumina in an atmosphere of fluoride of silicium, the amorphous alumina being converted into a mass of crystals that had the composition of staurolite.

It will be seen that the fluoride of aluminium decomposes silica with production of fluoride of silicium and staurolite, and also that fluoride of silicium is decomposed by alumina with production of fluoride of aluminium and staurolite. Owing to this circumstance the clay of the crucibles used in these experiments was entirely converted into a mass of crystals, consisting almost exclusively of staurolite, and that in the presence of clay the volatile fluorides may serve to effect the crystallization of infusible substances at the high temperatures at which the vapour of these fluorides becomes active. No trace of fluorine remains in the silicates produced in this way.

It would appear that these experiments will not be without utility as regards the elucidation of certain geological phenomena, especially the production of minerals in lodes.

ON A PHOTOCHEMICAL METHOD OF RECOGNIZING THE NON-VOLATILE ALKALIES AND ALKALINE EARTHS.

BY R. CARTMELL, ESQ.

As has long been known, the non-volatile alkalies, when put into the flame of a burning body, have the property of communicating to it peculiar colours; and in the case of soda and lithia, these colours are of considerable intensity. As a mere trace of soda, however, is sufficient entirely to obscure the colours communicated to the flame by potash or lithia, this as a means of distinguishing between them has hitherto been of very limited application. The following way of detecting them in the presence of each other depends on a means of observing by coloured media the characteristic rays of light which each emits when heated strongly in a colourless gas flame. On account of the homogeneous nature of the colour given to the flame by soda, I thought it possible to eliminate the soda reaction by the use of a coloured medium. After a great many experiments with various coloured solutions and other coloured media, I found that a bluish-coloured solution would best accomplish this object. The only solution that I have yet found to answer perfectly for obliterating the colour of soda, and allowing other rays, namely red ones from lithia and potash, to pass freely through it, is solution of indigo. This solution possesses these advantages—that it is met with in most laboratories as a reagent, is readily diluted to the required intensity, and when so prepared will keep good for some time.

When the absence of potash has been ascertained by a method which will be presently described, the above solution gives one a means of rendering visible the red rays from lithia in the presence of soda, when the proportions do not exceed one part of the former to a thousand parts of the latter. When potash is viewed through this indigo solution red rays are likewise observed, and these can be seen till the proportion of potash to soda is less than one part to two hundred. To distinguish potash in the presence of soda or lithia, it was necessary to find a medium through which no coloured rays from soda or lithia would pass, but which would admit those peculiar to potash. This was found to be a deep blue cobalt glass which I had cut up for the purpose. Potash viewed through this glass gives to the flame an intense violet colour; and this is still visible when one part of potash is present with two hundred parts of soda. I have not yet succeeded in getting a medium that will permit rays from lithia to pass, and at the same time keep back all those from soda or potash. But the presence of lithia can be ascertained in that of potash, or of potash and soda, in the following way:—Place side by side in the flame two wires, one having on its point a little pure sulphate of potash, and the other the sample to be tested. If there be lithia in the sample to the extent of one part to two hundred parts of potash, a very marked difference will be seen between the colour of the two flames, that containing lithia being of a much brighter red. When soda, potash, and lithia occur together, one part of each can be seen in the presence of two hundred parts of the mixture. As soda in the minutest quantity is visible to the naked eye, we have now a perfect means of separating the three alkalies from one another.

The following table will show how the separation is best effected:—

Mode of separating the Alkalies.

With the naked eye.	*Cobalt glass.*	*Indigo solution.*
Yellow: Soda.	Violet-red: Potash.	Comparative test with pure sulphate of potash. Brighter red than sulphate of potash alone: Lithia.
		When the absence of potash has been previously proved by the cobalt glass, red rays visible through the solution proves the presence of lithia.

The indigo solution is conveniently made by adding water to the common indigotic acid of the laboratories till the point is all but reached where an intense flame of soda appears slightly pink when observed through the bottle (of the size and shape of a common watch) filled with the solution.

The blue glass hitherto used is very thick and of considerable depth of colour; but on repeating these experiments, I have found that the blue glass as usually obtained from the manufactory, when increased to the same depth of colour by putting two pieces together, answers the purpose perfectly. Before using these glasses, it must first of course be ascertained how small a quantity of potash mixed with soda or lithia they will clearly indicate.

For the success of these experiments the importance of employing a perfectly colourless flame is obvious. I have used the flame of a Bunsen's lamp, which is of the palest blue except just at the tip, and devoid of any trace of red. The most intense flame of soda should only make this blue a little brighter when viewed through the indigo solution.

The substances to be exposed to the flame are conveniently supported on the finest platinum wire melted on to a glass stand, and the wire is to be somewhat curved, as in the subjoined diagram. The curved part is first heated, and so introduced into the flame that the point of the wire where the substance rests is just within the edge of it. When the wire is somewhat curved and heated as above directed, it hinders the escape of the substance from its proper position.

The alkalies are best tested for in the state of sulphates, as these salts do not volatilize so rapidly as the chlorides, and hence their colours are more permanent. To increase the intensity of these reactions, it is only necessary, after having put the substance contained on the point of the wire into the reducing flame, to moisten it with hydrochloric acid and to hold it again in the edge of the flame.

In making these observations, care should be taken not to mistake the glowing platinum wire for a coloration of the flame. The coloured rays passing immediately upwards from it are only to be regarded.

Separation of the Alkaline Earths.

Hitherto, in the detection of strontia by means of the colour communicated by its chloride to the flame of alcohol, there has ever been a difficulty in distinguishing it when small quantities are present. Here I may add that this method is particularly adapted to the discovery of small quantities of strontia; and also, when the substances of this group occur in so small quantities that they are no longer recognizable in the wet way: by the reactions of the flame and coloured medium they are readily distinguishable.

The characteristic colours which baryta, strontia, and lime communicate to the flame, are best observed when their sulphates are exposed on the point of a piece of the finest platinum wire to the outer part of an air-flame. And further, during the burning, the colours they produce can be increased in intensity by first putting

them into the reducing flame, and then either moistening them with hydrochloric acid, or by holding some asbestos moistened with this acid in the flame, directly under the point of the platinum wire on which the substances are supported.

In commencing the experiments with this group, in order to ascertain how far these characteristic colours would serve to distinguish the members of it, I observed that in all proportions, as far as they are capable of being recognized in the presence of each other, they always burn away in the following order:—First is seen the green of baryta, next the bright red of strontia, and lastly the dull and scarcely visible red of lime. When, however, a large quantity of strontia or lime is present in proportion to the baryta, the red colours of the two former are observed at the same time; and in this case the green of baryta can only be seen distinctly by passing the wire on which the substance is supported in and out of the flame during the observation. On continuing these experiments, I found also that when much lime was present, it modified considerably the colours of baryta and strontia; so much so, that these two last, when in small proportions, could not be distinguished. I tried further the effect of looking through coloured media, as in the case of the alkalies, but could find none that were altogether satisfactory. By a solution of indigo more dilute than that used for the alkalies, strontia can be distinguished from lime, as through it lime appears olive-green, and strontia intense red, when they are first introduced into the flame after being moistened with HCl. As it is easy to separate the baryta and almost all the strontia from the lime by means of dilute sulphuric acid, and as when only baryta and strontia occur together they are easily distinguished by the naked eye, when one part of baryta occurs with one hundred parts of strontia, and *vice versâ*, I found it best to separate baryta and strontia together from the lime.

The following method answers perfectly for their separation. The carbonates as usually obtained are dissolved in hydrochloric acid, and to the solution diluted with water, dilute sulphuric acid is added. The sulphates of baryta and strontia produced are to be separated from the lime by filtration through as small a filter as possible, and which has been previously washed out with dilute nitric acid. When the precipitate is very small in quantity, it is necessary to burn the filter, and then to test the residue on platinum wire in the usual way. When strontia occurs in very small quantity, it will not be precipitated; but on adding ammonia and carbonate of ammonia, will go down with the lime, from which it can be separated and tested according to the manner described in the table.

Separation of the Alkaline Earths.

The carbonates as usually obtained are dissolved in hydrochloric acid, and to this solution diluted with water, dilute sulphuric acid is added.

Precipitate.

Sulphate of baryta and sulphate of strontia.

Test on platinum wire in the air-flame: green (baryta), red (strontia). To the original solution add sulphate of strontia. A precipitate indicates the presence of BARYTA.

Filtrate.

Sulphate of strontia and sulphate of lime.

Add ammonia and carbonate of ammonia.

Precipitate.

Carbonate of strontia and carbonate of lime.

Collect on a filter and dissolve in a little nitric acid, evaporate to dryness on a water-bath, and treat with a little strong alcohol.

Residue.

Nitrate of strontia.

Convert into sulphate and test on platinum wire in the flame, after having reduced and subsequently moistened with H Cl. Through dilute solution of indigo,

Carmine-red:

STRONTIA.

Solution.

Nitrate of lime.

Add oxalate of ammonia.

Precipitate.

Oxalate of lime not soluble in acetic acid. Convert into sulphate and test on platinum wire in the flame, after having reduced and subsequently moistened with H Cl. Through dilute solution of indigo,

Olive-green:

LIME.

The dilute solution of indigo, to distinguish between strontia and lime, is made by diluting the common indigotic acid till it gives with sulphate of lime an olive-green colour, on testing in the manner directed. Care must be taken not to make this solution too dilute, otherwise sulphate of lime appears slightly red through it. It is to be used in the same kind of vessel as the indigo solution for the alkalies.

In testing for this group, it is necessary to allow the soda, which is always present, to burn off first, then the colours of the other substances become distinctly visible.

For this mode of distinguishing the alkalies and alkaline earths, very small quantities of substance are necessary; and the analyses can be made with somewhat better results when daylight is excluded.

I am indebted to Professor Kirchhoff for determinations of the rays which come through the solutions of indigo and the blue glass that I have used in my experiments. The dilute solution of indigo allows all the rays of the spectrum to pass except the dull red ones bordering on the orange. The solution of indigo used to distinguish the alkalies, allows those rays to pass extending from A to B and from E to G; and the blue glass those extending from A to *a*, and from F to H of Fraunhofer's lines of the spectrum.

A little reflection will show that the method described in this paper depends on the following principle. If there be any difference in colour between two flames, the medium which will give white light with one of the flames will give coloured light with the other. Two substances, therefore, which communicate colours to the flame, unless these colours be exactly alike, can be distinguished by a medium producing white light with only one of them.

By following out the investigation I hope to be able to determine potash quantitatively in the presence of soda, and to effect separations between some of the heavy metals.

I am indebted to Professor Bunsen, in whose laboratory this investigation was carried on, for many valuable suggestions.—*Philosophical Magazine.*

PRACTICAL OBSERVATIONS ON THE PRESERVATION AND DISTILLATION OF ROSES AND ORANGE-FLOWERS.

BY M. STANISLAUS MARTIN.

The ancient Greeks and Romans, surfeited with the excesses of the table, had recourse to perfumes to stimulate their blunted senses. At Rome, the odour of the rose was in such request, that Lucullus expended fabulous sums, in order to be able to have it at all seasons. During the past century, the odour of orange-flowers was so much in vogue, that the cultivation of Louis the Fourteenth's orange-trees was a source of considerable expense, for the great king would have one of these favourite shrubs in each of his apartments. In our days too, Fashion, that despotic and capricious queen, who, as Montaigne says, twists and turns the understanding of the French, also demands perfumes. The poor will have them, as well as the rich; and their consumption is such, that the perfumers of large cities, particularly those of Paris, monopolize all the sweet flowers which are brought to market, and leave none to supply the wants of Pharmacy; the consequence is, that the commercial value of such flowers almost always attains to a very high price. Roses are sold for from fifty to sixty francs the hundred-weight; the same quantity of orange-flowers brings from 250 to 300 francs; so that the Pharmaciens are obliged to purchase in the south of France distilled waters, which never possess the sweetness of perfume presented by those manufactured in Paris.

I am certain that this inconvenience may be obviated. Five years of trial and experiment have proved to me that provincial Pharmaciens may preserve odoriferous flowers for several years, or send them from one part of France to another, without their losing their perfume. The preservative agent is sea-salt, that *corpus divinum* of Homer and Plato.

The Hebrews were acquainted with the antiseptic properties of common salt; they employed it in the preservation of their meats. This substance likewise played an important part in the sacrifices of paganism; it was thrown on the flesh of the victims, to retard their putrefaction.

In the middle ages, the alchemists said, *cum sole et sale omnia fiunt.* It was surely

this thought that suggested to Wilhelmbulkels the idea of making use of chloride of sodium in the curing of fish. The plan succeeded so well with him, that Charles the Fifth, being in the Low Countries, went to Bier-Vliet to see the tomb of the humble fisherman, wishing thereby to honour the memory of one who had rendered so great a service to his country.

The use of kitchen salt has already been applied to the preservation of medicinal plants. Trouvain, in his *Apothicaire Charitable*, Baumé, Morlot, Lemery, Guibourt, and several other Pharmacologists, speak of it—only the directions have been forgotten. However, it would be rendering an immense benefit to revive the plan, particularly as the mode of operating is very simple. It is sufficient to arrange the rose-leaves or orange-flowers in vessels of stone-ware or glass, interposing a stratum of salt between each layer of flowers, until the vessel is quite full. Care must be taken to choose the driest flowers, and to avoid bruising them; otherwise they would ferment, and the water obtained from them would acidify, and would in time acquire a smell of valerianic acid, as M. Omar Dabat has observed.

Waters obtained from salted vegetable matters have an aroma as strong and as sweet as those distilled from plants gathered only a few hours previously; that from the rose appears to acquire even greater strength. I have kept petals of the rose for two years; the distilled water yielded by them resembled the Indian attar, or the Athenian essence of roses spoken of by the Jesuit Rapin.

Salt, which has served for the preservation of undried plants, may be used for fresh distillations; it is sufficient to subject the decoction to strong expression, to evaporate the fluid to a suitable consistence, and to allow it to crystallize by rest.—*Bulletin Général de Thérapeutique.—Dublin Hospital Gazette.*

OILED PAPER AS A SUBSTITUTE FOR OILED SILK AND GUTTA-PERCHA IN SURGICAL DRESSINGS.

This material was introduced by Dr. James McGhie, of the Glasgow Royal Infirmary, and has been used with success in hospital practice.

The following is the mode of preparing it:—

Having secured a paper of good texture, the next desideratum is the fluid or varnish by which it is to be coated and waterproofed. This is made by re-boiling boiled linseed oil with litharge, acetate of lead, sulphate of zinc, and burnt umber, an ounce or two of each to the gallon of oil. No artificial heat is employed in drying. A square board is now procured, several inches broader than the size of the sheet to be prepared. Upon this the sheet is spread, and well covered, by means of a broad brush, with the mixture. The first sheet should be brushed on both sides. On this a second sheet is placed, slightly projecting over the first, at one end, in order to facilitate the lifting of the sheets when they are to be hung up to dry. This is also to be coated with the mixture. This process is to be repeated till a mass of sheets, from twenty to fifty in number, is prepared. The board is then to be carried to some unoccupied apartment, across which cords have been stretched, and the sheets are to be lifted *seriatim*, and attached by one end to the cords by means of bent slips of zinc or tinned iron. A very small space is sufficient to hold a hundred sheets or more. After twenty-four hours or more, it is ready to be taken down. As the sheets are found to be liable to stick to one another, they may be dusted with French chalk, which prevents adhesion. The addition of a little wax and turpentine renders the dusting or any other measure unnecessary. There is only one part in the above process where any manipulatory difficulty may at first be encountered, and that is in spreading, evenly and expeditiously, the dry sheet on the oiled one. This is easily overcome by working the brush freely from the centre to the circumference of the sheet.

The following are its more obvious advantages:—

1. Its extreme cheapness does away with any inducement which might otherwise exist to employ the same piece more than once. A ream, or 480 sheets, of paper, costs from 7*s.* 6*d.* to 10*s.*, and a gallon of the prepared oil about 3*s.*; so that each sheet costs a fraction of a halfpenny. This does not include the cost of manufacture, which would slightly increase the expense.

2. Its transparency.—When applied over the dressings of a stump, or any cut surface, when hemorrhage may be feared, the danger can be seen at once, and obviated.

3. Its lightness.—It adds little to the weight of dressings, and it can cause little or no pressure on a tender surface. It is particularly useful in this respect for covering large burnt surfaces.

4. Its extreme adaptability.—It can be applied with great niceness to any part, so as to give rise to little or no inconvenience. When applied in any particular way, it retains the form impressed upon it.

5. It can be torn easily in any direction. In this respect it contrasts favourably with oiled silk and gutta-percha.

6. It can be made of any required strength by folding it one, two, three, or more times, without becoming inconveniently thick.

7. It possesses a certain amount of adhesiveness, which is increased by the heat of the body, and thereby more effectually prevents evaporation from wet applications.

ON THE EMPLOYMENT OF CHLOROFORM IN THE EXAMINATION OF FLOUR MIXED WITH MINERAL SUBSTANCES.

BY M. J. L. LASSAIGNE.

The uses of chloroform in isolating some principles soluble in it, has already been pointed out in several cases of proximate analysis of certain parts of vegetables. In like manner this product has been employed in certain inorganic or mineral analyses.

Since the publication of these facts, of which Chemists and Pharmaciens have been able to make practical application, I have been informed by a distinguished Pharmacien of Charleville, M. Cailletet, formerly intern in the Paris hospitals, that the use of chloroform has been extended to the analysis of the farinas of the cerealia, or of other varieties of flour suspected of being mixed with mineral substances.

On a journey which I had occasion to make to Charleville, in the month of January last, M. Cailletet, with whom I was associated in a judicial investigation, communicated to me his results, and kindly exhibited to me this action of chloroform on pure farinas, and on farinas mixed with mineral substances. A great number of the latter are naturally not only insoluble in this fluid, but they possess generally a greater density than it does; it is therefore on this property that M. Cailletet has based the equally simple and ingenious method which he has employed to discover even the ten-thousandth part of mineral matter mixed with a specimen of flour. The density of the farinas being much less than that of chloroform, it is evident that they will be easily separated from the matters heavier than this fluid interposed between the particles of farinas.

This operation is, in some measure, a mechanical proceeding, which causes all the farinaceous molecules to rise above the chloroform, while the foreign mineral matters are deposited at the bottom of the fluid which occupies the space intermediate between the former and the latter.

A tube of glass or crystal, about an inch in diameter, and six or eight inches long, which is closed hermetically, in order to mix the chloroform thoroughly with the farina submitted to experiment, is conveniently adapted to this operation.

One or two drachms of the suspected farina are introduced into the test tube; chloroform is poured over the farina so as nearly to fill the tube; the latter is closed, and shaken for some time.

After a repose of longer or shorter continuance, according to the temperature of the place in which the experiment is carried on, the tube being placed in a vertical position, the separation is effected: the lighter farina occupies the upper part, and below the layer of chloroform at the bottom of the tube are collected the foreign matters which were mixed with the flour.

It is by means of this simple plan that M. Cailletet has been able to isolate directly either very small quantities of arsenious acid in powder mixed with flour, or alum in fine powder, or any other mineral substance. The sand or débris of the millstone, which might accidentally be mixed with the flour, would thus be isolated without the necessity of having recourse to the incineration of the flour itself, as is practised in the examination of farinaceous matters.

The ulterior examination of the matters separated from farina by chloroform is then very simple: the chloroform is decanted to collect the deposit formed in it; the latter is dried on tissue paper, and nothing remains but to investigate its physical

and chemical properties according to the methods employed in laboratories, and which are daily employed by Chemists.

This new method, for which science is indebted to M. Cailletet, will doubtless find more than one application in scientific researches, and perhaps in the industrial arts.—*Annales d'Hygiène publique et de Médecine légale*, 1858, p. 199.—*Dublin Quarterly Journal of Medical Science.*

ON IGASURINE, AN ALKALOID CONTAINED IN NUX VOMICA.

BY M. SCHUTZENBERGER.

M. Desnoi, several years ago, discovered in the nux vomica a new base, igasurine, which differs from brucine by its great solubility in water; no analysis was published, however, to establish its composition and equivalent. Having several specimens of igasurine which had been delivered to me for brucine, I determined to profit by the opportunity and fill up this deficiency, but after three determinations, I perceived, from the discordance in the results, that the substance operated upon was not homogenous. In fact, on treating my specimens with cold water, I obtained nine new alkaloids, differing in their composition, and the separation of which may be effected through their difference of solubility in cold water, or the point at which they crystallize, during the cooling of their solution. It is probable that on continuing my researches, I may again obtain a number of distinct bodies. In order to definitely establish the existence of each of these bases, they were all analyzed twice, the substance being re-crystallized for the second analysis. The accordance of the results established the identity of the substance.

These bases are colourless, and have a very persistent bitter taste. Their action upon the animal economy is quite as energetic as that of strychnia. They are perfectly soluble in boiling water, but with very different degrees. They crystallize in transparent needles, or in numerous tufts, which are very voluminous. Nitric acid colours them red, like brucine. All the water of crystallization which they contain, (6 or 8 equivalents) is eliminated at 212° F. They do not melt in their own water, although some soften. Two among them appear to become resinous; this condition, however, is not constant.

The following is the list of these bases, which I have named igasurines :—*a*, *b*, *c*, *d*, *e*, *f*, *g*, *h*, *i* :—

Strychnine...C_{42} H_{22} N_2 O_4
Brucine .....C_{46} H_{26} N_2 O_8, 8 HO
a .....C_{44} H_{26} N_2 O_8, 6 HO .....very little soluble
b .....C_{36} H_{24} N_2 O_{14}, 6 HO .....slightly soluble
c .....C_{36} H_{24} N_2 O_8, 6 HO .....readily soluble
d .....C_{34} H_{32} N_2 O_{16}, 6 HO " "
e .....C_{36} H_{26} N_2 O_8, 6 HO " "
f .....C_{42} H_{30} N_2 O_8, 6 or 8 HO " "
g .....C_{42} H_{28} N_2 O_{12}, 6 HO .....very little soluble
h .....C_{42} H_{26} N_2 O_{12}, 6 HO .....readily soluble
i .....C_{40} H_{26} N_2 O_{14}, 6 HO " "

These bases resemble brucine in their chemical characters, with the exception of their great solubility in water and alcohol. They may be considered as products of the successive transformations of the last substance under the influence of vital force.

ON THE PREPARATION OF LIQUID TARTRATE OF POTASH, AMMONIA, AND PEROXIDE OF IRON.

BY M. CARRIÉ.

The potassio-tartrate of iron being incapable of preservation in aqueous solution, on account of its tendency to rapid decomposition, M. Carrié, a pharmacien in Paris, has conceived the idea of insuring its solubility, and particularly of preserving it, by the addition of ammonia. The following is the mode of preparation recommended by the author :—

Take sixteen ounces of bitartrate of potash ; dissolve one-half in three quarts of warm distilled water ; saturate this solution with pure sesquicarbonate of ammonia ; add the remainder of the bitartrate ; raise to a moderate heat, adding by degrees,

and to excess, recently precipitated and still moist peroxide of iron ; afterwards filter, to separate the uncombined oxide ; evaporate at the heat of a water-bath, until the cold liquor marks seven degrees on the saccharometer ; add a few drops of liquid ammonia ; shake ; allow it to deposit during twenty-four hours ; filter again, and preserve for use.

The preparation of tartrate of potash, ammonia, and peroxide of iron thus obtained, is, according to M. Carrié, a liquid of an agreeable taste, possessing a reddish-brown colour, keeping for an indefinite period, and containing one part of iron in nine of water.—*Bulletin Général de Thérapeutique*, 15th July, 1858, p. 23, and *Dublin Hospital Gazette.*

ADULTERATION OF FOOD AND SALE OF POISONS.

A MEETING of the citizens of Manchester was held at the Town Hall, January 17th, to take these questions into consideration. The meeting had been convened in consequence of a requisition to Mr. Ivie Mackie, the Mayor, who presided.

The Rev. Canon RICHSON, in rising to propose the first resolution, said:—I will take the opportunity of explaining what was the occasion of the present requisition presented to the Mayor. The Committee of the Manchester and Salford Sanitary Association had turned their attention, for some time, to those subjects of public interest which are mentioned in the requisition. It will be remembered that some time ago the public feeling was very much excited with relation to the adulteration of food, when statements appeared in the public prints which occasioned considerable anxiety, if not alarm. We know also that, subsequently, there were cases of poisoning of a most painful character, which likewise excited the public feeling ; and it was felt that some steps should be taken to prevent the recurrence of such fatal events. And lately, we know that, in the case of Bradford, from very great carelessness, there has been an occurrence of a most distressing character, whereby a large number of persons were made ill from poisoned lozenges and many died. These were events which demanded serious attention, and you must be aware, from the reports of the Sanitary Association, that subjects of this kind have engaged the attention of the Committee for a considerable period. The difficulty of dealing with them, however, appeared to the Committee very great, and any reflecting man will see that, having due regard to the protection of the public on the one hand, and the rights of trade on the other, the questions that are involved are of the most difficult character possible. Nevertheless, the Committee have made up their minds, in some respects, as to what might be done with regard to food. They feel very strongly the perplexity with which the question is encompassed, and hence they are not prepared to recommend anything beyond an extension of powers which are already possessed by local authorities, and have been found to have very beneficial effects ; believing that if such powers were extended, although only occasionally called into operation, the fact of their existence would deter the dishonest tradesman from acting improperly, and at the same time protect and encourage the honest tradesman. In respect to the sale of drugs and poisons, we can go a step further, because the course which ought to be pursued is actually pointed out by those who are themselves interested in the matter ; and I think we ought to pay some respect to recommendations of persons practically acquainted with subjects of that kind. The Committee, therefore, having arrived at such opinions, felt it was desirable that the public sentiment should be ascertained in relation to the questions I have just mentioned, and accordingly they drew up a requisition, which was extensively and rapidly signed, and the result of which is the present meeting.

The resolution which I have now to propose, is this:—

"That inasmuch as the indiscriminate sale of poisons has frequently led to serious and fatal results, it is the opinion of this meeting (due regard being had to the case of individuals already established in trade) that no person should be permitted to sell drugs or dispense medicines without a certificate of competency from some duly constituted public authority; and that, in all cases, the sale of poisons ought to be regulated by Act of Parliament."

Now, gentlemen, I will not enter into the circumstances which have led to my proposing this resolution. No doubt we are all aware that very painful results have attended the indiscriminate sale of poisons. We are all aware that it would be

advantageous if the mode of dispensing and selling medicines were judiciously regulated. I shall, therefore, take it as granted, as far as I am concerned—leaving to my friend, Mr. Turner, the more complete elucidation—that circumstances have rendered it necessary that we should go into this question. It may not be known to the meeting generally that the state of the law at present in respect to Chemists and Druggists is, that any man, without restriction, I believe, may open a Druggist's shop, and sell drugs, although he may have no previous knowledge whatever of the matter—any person may open a shop of that kind if he thinks proper, and sell drugs. Surely that is a degree of liberty which requires to be, in some degree, restricted, as the subjects with which such persons have to deal are of a most important and frequently a most deadly character. A large proportion of the Chemists and Druggists of this country have formed themselves into an association, which is called the Pharmaceutical Society. Now, my friend, Mr. Standring, who is here present, and is, or was a member of the Council of that Society, and not very likely to join in a movement that would be prejudicial to the Chemists and Druggists in any way, will tell you that this Society was formed some years ago for the purpose of doing what every reasonable man will consider ought to be done; and that is, to secure the proper education of the Chemist and Druggist, and to provide that a man should not be allowed to practise in that profession or trade unless he had obtained from some duly constituted authority a certificate that his previous education had made him acquainted in a sufficient degree with the subjects which he had to handle. [The rev. gentleman then read some extracts from a petition addressed by the Council of the Pharmaceutical Society last year against the Government Bill for regulating the sale of poisons, for the purpose of showing what were the chief objects of the Society.] When you see, therefore, "Pharmaceutical Chemist" attached to a Chemist's name, understand that that title is not to be assumed by any persons who are not admitted members of that Society, or have not passed such an examination as is thought necessary by the Pharmaceutical Society for the conducting of their trade satisfactorily. The resolution which I have read proposes to exempt the persons at present in trade from examination, or disqualification to act as they are now doing. I think this a most just and proper provision. But in respect to the future, while I would not be a party to any movement whatever that would inflict an injury upon those now honestly and properly in trade, I think it of the greatest importance that, in all future cases, young men who are now rising up ought to be subjected to an examination. A systematic course of study ought to be prescribed, and I think it much to the credit of the Pharmaceutical Society, that one of its objections to the Government Bill was that the examination was not sufficiently stringent, nor the course of previous study sufficiently defined. While, therefore, I desire to see an exception made in the case of all persons now in trade, I do hope that this meeting will affirm the resolution which I have proposed, that it is a desirable thing in future that no person should be allowed to practise the trade or profession of a Chemist or Druggist before he has been subjected to a sufficient examination by some competent "public authority," and that "in all cases the sale of poisons ought to be regulated by Act of Parliament." Here again we find that the Pharmaceutical Society have suggested a mode which they think it would be advisable to adopt; laying down this important principle, that you must have education, you must have men properly taught—men who, in consequence of their education, will be trustworthy—as the surest guarantee for the public against the indiscriminate sale of poisons. In this opinion I concur, although I think the concluding provision of the resolution needful also; but I think I may say, to the credit of the Chemists generally, and certainly of the more educated class of this city, that I do not believe they would allow any person to have an ounce of laudanum unless they knew him. Nevertheless, there is a very large number of persons who are incompetent for the trade which they have undertaken, and it would be a most desirable thing, in my judgment, to affirm the resolution which I now move.

Mr. Thomas Turner, F.R.C.S., seconded the resolution. He illustrated his observations by several examples of poisonous confectionery, and noticed the injury caused by adulteration with such substances as daft, even though not on the usual list of poisons. He pointed out forcibly the necessity of education in all dispensers and vendors of drugs, and thought it would be to the advantage of the country if the Pharmaceutical Society were entrusted with the responsibility of regulating the

matters referred to in the resolution. Mr. Standring supported the resolution, which, after a few remarks of little importance, was carried almost unanimously.

Mr. Thomas Bazley, M.P., moved the second resolution:—

"That, the adulteration of food having been proved to exist to a very large extent, and the consequences resulting therefrom being most injurious to the public, both in sanitary and commercial points of view, and great benefits having heretofore resulted from inspection of certain articles of food, it is the opinion of this meeting that the corporate and other local authorities ought to possess the power of inspecting all food offered for sale, and that the vendors of food injuriously adulterated should be subjected to a penalty."

He alluded to the loss of life from accident, ignorance, and crime, and laid some stress on the wickedness of adulterating drugs, mentioning the case of a Chemist who was asked to do so to meet the competition, as most of his neighbours undersold him. He refused to do so, and instead of losing business, had as much as he could do. He felt sure the House of Commons would respond to the appeal of the public on this subject.

Professor Crace Calvert seconded the resolution. He said he had been more than twenty years engaged in the examination of articles of food and medicine among other chemical pursuits. He mentioned a great number of instances of gross adulteration likely to be injurious to health or life, and said it was in those cases that the law ought to interfere, and not in trivial cases where the amount of adulteration was slight and not likely to be injurious.

Some amusement was caused in the meeting by the Rev. W. Cane endeavouring to add a rider to the motion, including alcohol among poisons; and also by a facetious gentleman, who denied the existence of adulteration, had never met with any adulterated bread, unless it might be with a minute portion of alum, and he considered alum a wholesome tonic—a very good tonic. After some laughter, the business of the meeting proceeded, the resolution being carried almost unanimously, and a petition to Parliament, founded on the resolutions, was agreed to.

THE INSURANCE OF CHEMISTS' STOCK AND FIXTURES.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—My attention has been drawn to the letter of Mr. Humpage inserted in your Journal of this month, and as it is desirable that the insurance offices should stand well with their clients, I venture to trouble you with a few observations, in the hope of putting the subject into the right light for both parties.

In the first place, it is not so "absurd" as Mr. Humpage presumes it to be, that a Chemist should insure his "jalap and rhubarb" *only;* first, because it is not *always* the fact that the drawers, &c., belong to him (though they *generally* do), but unless this be explained to the office, the company can know nothing about it, and are bound to suppose that if the Chemist wishes to insure his fixtures, he will, of himself, take care to do so; secondly, because some men choose to run part of the risk themselves and select that portion as their own; and who shall say that they have not a right to do so, even at the risk of being thought singular, or even absurd?

But, after all, the foregoing does not bring home the right point; for, as a rule, a Druggist's trade property is dividable into three or more parts:—

1st. The articles in which he deals, by the buying and selling of which he *trades* for a profit. These are strictly his "*stock* in trade."

2nd. The utensils or instruments used in carrying on the trade: such as weights, measures, bottles, &c.

3rd. The fixtures and fittings of his shop or other place of business. These, as I have said before, are not *always* the property of the occupant, and he has no interest in them beyond such additional rent as he may pay for their use; but if he has an interest, then he *may* insure, if he desire so to do, as no good office will object to meet and accommodate his wants.

Each of these natural divisions may be separately insured, or the first and second may be insured in one sum, and the third separately, or they may be all included in one amount; but to be *legally insured*, all (*or* any of them) *must* be mentioned in the policy.

In conclusion, I beg your readers to bear in mind that it is a duty they owe to themselves to read their policies, and see that they have the insurance they require; and, if they have not, to get their insurance corrected, either at once or at the next renewal time, and having done this they may rely upon it that the insurance offices cannot do them an injustice, *even* if they were inclined to such an unworthy action.

Finally, let none seek to blame others for the effects of their own want of thought and care.

I remain, Sir, yours faithfully,

London, 12th January, 1859. A Fireman.

THE LATE SHEEP POISONING CASE.

Mr. Black, of Burton, who sustained the loss of nearly 700 sheep in August last —they being poisoned, as is alleged, by a sheep dip—has entered the case at law, and a writ has been served upon Mr. Elliot, Chemist, of Berwick, who supplied the dip, claiming damages for the loss. The case will come on at the next Newcastle Assizes.

FATAL CASES OF ANÆSTHESIA.

There are in London 15 hospitals where surgical operations are being frequently performed. Some of these are small ; we will, therefore, confine our attention to the 10 largest metropolitan hospitals. St. Bartholomew's is immensely large ; at the lesser Hospital of University College 4440, and at Charing-cross Hospital 1600 operations have been performed under chloroform during the last 10 years. St. George's, though larger than University College, is probably of medium size, and may therefore be fairly taken as representing the average number of operations which are performed in each of the other nine. In this hospital 3000 operations are said to have been performed within the period just mentioned. If we multiply this number by 10, which is the number of the principal hospitals in London, it appears that at least 30,000 operations have been performed in the metropolis during the 10 years in which chloroform has been used. We are aware that, according to the statistical statements respecting the surgical operations performed in London which have been published in the *Medical Times and Gazette* during the last four years, and which we have carefully examined, not more than 10,000 operations have been performed in London during the last 10 years. But those statements only comprise the "principal operations," and must exclude, as indeed we know they do, and, as is proved by the *data* obtained from St. George's, University College, and Charing-cross, an immense number of cases in which chloroform is given. Now, if, without considering the upper classes, who do not resort to hospitals, we regard the hospitals of London as affording surgical aid to all who require it out of a population of, say 3,000,000 ; if we suppose that the rest of the population of the United Kingdom, and the population of France, Germany, and the United States demand surgical aid in the same numerical proportion as the people in and around London seem to do ; and if we estimate the total population of these countries at 120,000,000, we arrive at the conclusion that during the last ten years the number of surgical operations which have been performed in the United Kingdom, the United States, France, and Germany collectively is 1,200,000. We have confined ourselves to these countries because it is from them mainly, though not exclusively, that the reports of deaths from anæsthetic agents have been collected. Among the deaths ascribed to chloroform there are seven the cause of which is uncertain. Assuming four of these to be due to chloroform, the following is a statement of all the deaths which we have been able to learn of as having occurred either in Europe or America from the inhalation of anæsthetic vapours:—Deaths from chloroform, 68 ; from æther, 2 ; from mixture of chloroform and æther, 1 ; from mixture of chloroform and alcohol, 1 ; from amylene, 2. Total, 74.— *Westminster Review* for January.

DEATH FROM LAUDANUM TAKEN BY MISTAKE.

On Friday, December 31st, a coroner's inquest was held at Eckton Hall, near Moultan, in Northamptonshire, on view of the body of the Hon. Mrs. Anson, the widow of the late General Anson, Commander-in-Chief of India, who met with her

death under the following circumstances. The deceased lady was a visitor at Eckton Hall, the seat of Mr. Ambrose Isted. She had suffered considerably from gout, and was in the habit of taking draughts, and applying laudanum externally for the purpose of alleviating her sufferings. On Wednesday evening she was in her chamber dressing for dinner, and, fearing an attack was coming on, she took from one of the drawers a bottle containing, as she supposed, one of the draughts, and emptying the contents into a tumbler, she drank the whole off. Experiencing some few minutes afterwards a disagreeable sensation, she desired her maid to look at the bottle from which she had taken the liquid, when it was discovered that the unfortunate lady had taken the laudanum in mistake for the draught, although the bottle was properly labelled "Poison." Oil, salt and water, &c., were immediately administered, in order to produce sickness, and several medical gentlemen of the district called in. Dr. Francis, of Northampton, and Mr. Durham, the consulting surgeon of Guy's Hospital, who was on a visit to Dr. Francis, were with the lady the whole night. The stomach-pump was applied, fresh emetics, then cold effusions, but with no satisfactory result. Galvanism was resorted to, and its powerful effect in rousing the patient justified some hope that eventually it would be successful. As a last resorce, Dr. Marshall Hall's plan for restoring suspended animation was tried. All failed, however, to counteract the effects of the poison, and at half-past nine o'clock on the following (Thursday) morning the unfortunate lady breathed her last. After the facts had been fully gone into, the jury returned a verdict to the effect that the deceased lady died from the accidental administration of laudanum, in mistaking it for a draught.

SUICIDES BY PRUSSIC ACID.

Dr. William Engledue, of Gloucester House, Southsea, a physician of considerable eminence, and having a very extensive practice in that neighbourhood, committed suicide on Thursday, December 30th, by swallowing a dose of prussic acid. Dr. Engledue had, during the past fortnight, been confined to his residence with symptoms of derangement of the liver and other digestive organs, which had produced great taciturnity, even towards his family and his closest friends, and great depression of spirits. Between seven and eight o'clock on Thursday morning, his sister, who resided with him, heard him moving about in his own chamber, and upon entering the room found that he had just thrown himself upon his bed, life being then, or soon afterwards, extinct. Dr. Engledue was the younger brother of Capt. J. R. Engledue, Superintendent of the Peninsular and Oriental Steam Packet Company's ships at Southampton.

On Wednesday, January 12, an inquest was held before Mr. Wakley, at the Marlborough Tavern, Abbey Road, on the body of Mr. Adolphus Ackermann, aged 50 years, the well-known book and print publisher, lately carrying on business in the Strand. The deceased, since his retirement from business, some months ago, had lived with his family in lodgings at 16, Blenheim Terrace, St. John's Wood. His circumstances appear to have been such as to cause depression of spirits, but there seems to have been no suspicion that he premeditated self-destruction. On the morning of the occurrence he was found lying partly undressed on his bed in a lifeless state. A tumbler that had contained prussic acid was found near the deceased, from which he had drunk a quantity of that poison. A letter was also found in the room, dated December last, in which he spoke of committing suicide, and said that he had previously taken laudanum for that purpose, but had failed in the attempt. The jury returned a verdict of "Suicide," the state of deceased's mind being left an open question.

POISONING BY SYRUP OF POPPIES.

On Thursday evening, December 30th, a long inquiry took place at the Westminster Hospital, before Mr. Bedford, on the body of Eleanor Freeman, an infant

eighteen months old. Mrs. Jane Freeman, the mother of the infant, said: "On Christmas Eve the deceased was very restless on account of teething. I sent a little girl to a Chemist's for twopennyworth of syrup of poppies. This was about five o'clock in the evening. I gave the infant two teaspoonfuls, but not becoming composed at ten o'clock the same night, I gave her another teaspoonful. We went to bed about eleven o'clock. About one o'clock I looked at my baby, and was shocked at finding her apparently lifeless. Mr. Riley, a surgeon, of St. George's Road, Pimlico, promptly attended, and pronounced life to have been extinct some time." Mr. Riley said he had made a *post-mortem* examination, and found that death resulted from the narcotic which had been administered to the infant. Evidence was brought forward to prove the strong affection of the parents for the infant, after which the jury returned a verdict, "Died from an overdose of syrup of poppies, incautiously administered by the mother, and recommend that Chemists be prohibited from selling such in small quantities."

POISONING BY COLCHICUM WINE.

Last week an inquest was held by Mr. Brent, deputy coroner, at the Red Cap, Camden Town, on the body of William Theodore Sandys, aged nine months. The evidence went so show that the deceased was taken ill with diarrhœa, and under medical advice the mother sent to the shop of Mr. Jones, Chemist, for a pennyworth of antimonial wine, on the morning of Friday, December 24th. A youth in his employ, as his master at the time had not come down stairs, contrary to repeated injunctions that he should on no account venture to serve any customer except under his master's directions, served what he believed to be antimonial wine, placing a label on the bottle stating how it was to be administered. In the course of the morning, after administering three doses of 15, 12, and 10 drops, it was found that the medicine did not have the desired effect of producing sickness, the mother sent to the Chemist's to know if it was right. This led to the discovery that, instead of antimonial wine, colchicum wine had been sold in mistake; and the youth, sixteen years of age, being interrogated, admitted that he had sold it. On finding this, Mr. Jones at once sent an emetic, and immediately after Mr. Harley, a surgeon, attended at his request. The child died at about half-past one on the following morning. Dr. Hayne, district medical officer, and Mr. Harley stated that the body of the child presented on a *post-mortem* examination all the appearances that might be expected in a person having had too much colchicum. Thomas Woodley, the boy, admitted that he sold the medicine in mistake, contrary to the orders of his master. After some deliberation, the jury returned a verdict to the effect, "That the deceased had died from the administration of colchicum wine instead of antimony wine, sold by Thomas Woodley, and that blame attached to his employer in permitting him to sell drugs in his absence."

POISONING BY OPIUM.

A case of poisoning occurred at Sheffield, on Saturday evening, January 8th, by which one child has lost its life, and the lives of two others are placed in great jeopardy. The wife of Mr. Thomas Brammer, powder-flask manufacturer, Hanover Street, having three young children suffering from colds, obtained from the shop of Mr. Hill, druggist, one pennyworth each of opium, Spanish juice, and juniper berries. Having made a decoction of the berries and dissolved the Spanish juice, she mixed them and the opium together, along with half a pound of treacle. About seven o'clock she gave the elder daughter, Mary, two table-spoonfuls of mixture, and the two younger children smaller quantities. About ten o'clock all the children were taken alarmingly ill. The father, learning what had been administered, at once called in Mr. Nicholson, surgeon, who found the children in a very dangerous state from the effects of the opium. He immediately applied the usual remedies, but without success as regards the eldest child, aged seven years, who died at three o'clock on Sunday morning. The other two children suffered severely, but there was hope that they would recover. Mrs. Bremmer is stepmother to two of the children.

POISONING BY "INFANTS' PRESERVATIVE."

An inquest was held at the Ryecroft Inn, Ashton-under-Lyne, January 18th, before Mr. Rutter, county coroner, touching the death of an infant male child of John Ridgway, mechanic, Stockport Road, Ashton, the child having died suddenly, as was understood from the effects of a sleeping cordial given by advice of the nurse. Mr. George Woollam, surgeon, Stamford Street, stated that he had attended the wife of Ridgway during her confinement, from the 7th of January to the 13th, when he discontinued his visits, leaving both mother and child well. About nine o'clock on the morning of the 15th he was requested to call and see the child, and found it in a state of stupor ; the pupils of its eyes were much enlarged, and it exhibited every sympton of being affected with narcotic poison. He inquired what the child had had, when he was shown a bottle containing a blackish-coloured fluid, of which the child had had half a tea-spoonful. From the state the child was in, and having ascertained there was opium or laudanum in the mixture, as well as knowing that the thirty-second part of a grain of opium had been sufficient, under such circumstances, to cause death, Mr. Woollam had no hopes of the child's recovery; and, notwithstanding every attention, it died about half-past four the same afternoon. He ascertained that Mrs. Walker, a midwife, who had been attending the mother, had recommended the stuff, and that her husband was the maker of it. Mr. Woollam expressed his opinion that the child had died from the effects of opium, and stated that under no circumstances should opium be administered to a child of that age, nor would it be, except by persons ignorant of its properties. The coroner said, as the medicine had not been administered by Mrs. Walker, and as she was not present when it was administered, the verdict would be one of misadventure. Had Mrs. Walker been present when it was administered, he should certainly have advised the jury to have sent her for trial for manslaughter, as it was quite time these practices were put a stop to. A verdict was returned in accordance with the opinion of the coroner.—*Manchester Guardian.*

OBITUARY.—THE DUDLEY CHEMISTS' ASSOCIATION.

We regret to be informed that this Association has ceased to exist. It was established some time ago by several zealous young men who were desirous of promoting pharmaceutical education. With this object they established a Pharmacy class at the Mechanics' Institution, where the members met for scientific discussion and reading. For a time the meetings were regularly attended, and appeared to excite general interest, some of the members continuing their exertions indefatigably to the last. But the causes of failure are stated to be—*First*, that some of the employers objected to their young men taking a part in it, or going out for that purpose in the evening. One said he was "afraid the apprentices would become conceited if they knew a little." Another thought it "presumption for young puppies to form an association." Another feared it would "degenerate into a drinking club." *Secondly*, some of the young men, whose employers rather encouraged them to join the Association, were not so disposed, but preferred other amusements and attractions, and so the numbers attending being small, became smaller by degrees, until the lamp of knowledge went out.

TO CORRESPONDENTS.

Free Trade in Ferns.—Mr. Robinson, of Warrington, has written to complain of a fern collector, who is travelling over the country to collect rare species of ferns for sale, and is thus exhausting the supply in some interesting localities. Mr. R. advises botanists not to encourage this practice by purchasing ferns of such persons. The subject has been noticed at meetings of the Phytological Society, and in this Journal : and botanists have been cautioned not to take the last specimen when on their rambles in search of plants. It is proper to leave one for manners.

Mr. C. J. L. Russell (of Windsor) has sent a letter on Unguentum Cetacei and bleached oil : the subject is so worn out, that it may be sufficient to state that Mr. Russell is entirely opposed to the use of bleached oil, and considers the result of the discussion unsatisfactory, because "it does not positively settle the question." The question is certainly reduced to a narrow compass. All parties condemn the use of lard, or of oil the properties of which are in any degree injured by the process of

bleaching. There are some who think the full depth of colour not essential to the properties of the oil ; but no person has yet defined the exact tint or shade at which olive oil should be rejected, as being too pale.

Mr. Gissing (Wakefield), in reference to bleached olive oil, observes that Mr. Phillips's *Translation of the Pharmacopœia* having been published with the sanction of the College, may be considered an authority. He also thinks that if the College had intended bleached olive oil to be used, it would have been ordered.

A Life Member (London).—(1.) Sumbul (Racine de Sambola or Sambula, *Guibourt*) was imported some years ago by Mr. Savory. (2.) See vol. xv., p. 508. (3.) It is not usual to keep infusions *close* to the fire during maceration.

J. E. H. rejoices in the prospect of the Pharmacopœia being published in English, and inquires whether candidates for the examination of the Society will be required to learn Latin. (Of course they will; dunces are not wanted.)

A Victim (Camden Town).—Fabrics may be rendered blaze-proof by soaking them in a weak solution of chloride of zinc. The dresses of stage dancers are prepared in this way.

S. P. O. (Horsham).—No condition, except that of competency, is required for the Examinations.

An Assistant (London).—Fownes's *Manual of Chemistry*, Royle's *Manual of Materia Medica.*

A Country Apprentice.—We shall be glad to receive information of the circumstances under which the cochineal was obtained, as it appears to be adulterated in a way that is new to us. A communication with name and address would oblige.

D. S. M. (Bath).—The usual mode of making the mixture described would be to mix the powders with the water, and then to add the tincture. There is certainly some difference in the appearance of the mixture, when first made, if the ingredients are put together in a different order; but after standing for some time the result is the same as in the other case. The chalk precipitates the colouring matter of the tincture.

G. H. (Derby).—Chloroform does sometimes undergo a change when kept, even in well-filled and closed bottles; and when this change occurs it is unfit for medical use. We have not observed this change in chloric ether.

E. C. R. should apply to the Secretary, with name and address, when the required information will be sent by post.

J. L. (Bedford).—*Ferri et Quinæ Citras.* The colour of the preparation depends much on the solution being spread very thinly on the dishes, and the heat being gradual.

A Physician (London).—A Chemist is not justified in substituting another preparation for one ordered in a prescription which he is not acquainted with. Such substitution can only be a guess. A case of difficulty may, however, occur, *the patient insisting on having the medicine*, after the fact has been explained. The patient then taking the responsibility, the Chemist must use his discretion ; but should immediately, or as soon as possible, inform the Physician of what he has done. See also our last number, answer to C. B., p. 391.

Pil. Rhei Comp. (Liverpool).—Under this title we have received a very good letter in favour of the Latin Language in prescriptions. We should have been glad to publish it if the author had signed his name ; but a letter on such a subject derives its value from the authority.

Chemicus (Manchester).—Dr. de Jongh's oil is not mentioned in the work.

Mr. Price, who advertises himself in the Maidstone Telegraph as a Pharmaceutical Chemist, is not, and has never been, connected with the Pharmaceutical Society. He has received notice of the illegality.

J. R. W. (London).—In the mixture alluded to, the quinine is precipitated by the tannin in the tincture of bark.

E. W. (Bayswater).—Too late for this month.

Erratum.—Page 347, line 28, *for* Compositus, *read* Compositum.

Instructions from Members and Associates, respecting the transmission of the Journal, before the 25th of the month, to the Secretary, Elias Bremridge, 17, Bloomsbury Square, W.C.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington St. Other communications to the Editor, 15, Langham Place.

THE PHARMACEUTICAL JOURNAL.

VOL. XVIII.—No. IX.—MARCH 1st, 1859.

THE PROCEEDINGS OF THE COUNCIL OF THE PHARMACEUTICAL SOCIETY IN REFERENCE TO THE SALE OF POISONS BILL.

The probability of the introduction of a Sale of Poisons Bill on the re-opening of Parliament has not been lost sight of by the Council during the recess. Taking into consideration the vigorous efforts which were made to pass the Bill of last session, the excitement which prevailed on the subject, and recent events tending rather to renew that excitement, it was the unanimous opinion of the Council that the public would not be satisfied without a Poison Bill of some kind, and that it would be the duty of the Society to be prepared to meet the question, not in a spirit of opposition, but with the endeavour to assist in the production of a Bill as free from defects as possible, and likely to promote effectually the object in view. It was not thought necessary or desirable for the Society to revive the public excitement, or to incur the responsibility of spontaneously introducing a Bill, on a subject difficult in itself, and rendered much more so by the various crotchets and theoretical schemes with which it has become entangled. It was, however, decided that the draft of a Bill should be prepared, which might be brought forward in case of need for the purpose of explaining and reducing to a tangible form the general principles which the Society could confidently recommend as the basis of a Sale of Poisons Bill. At the last meeting of the Council on February 2nd, the draft of a Bill prepared in accordance with the above decision was considered, and, with some verbal amendments, unanimously approved. The Bill, which was entitled an "Act to restrict and regulate the Sale of Poisons and the Dispensing of Medical Prescriptions," contained the requisite regulations for the keeping and labelling of poisons, with a provision that after a certain date no person other than a legally qualified Medical Practitioner or Pharmaceutical Chemist should sell poisons or dispense medical prescriptions without a licence: the rights of all Chemists and Druggists in business at the date of the Act being of course reserved, and the licence obtainable by them on the payment of a small fee. It also contained a provision for the addition of a physician appointed by the Secretary of State to each Board of Examiners of the Pharmaceutical Society, with some other matters of detail, which it is needless here to recapitulate. It was not proposed to repeal the Arsenic Act, or to extend to other poisons the system of entering each sale in a book. It was the opinion of the Council that a simple enactment of this kind providing for the qualification of the vendors of poisons and dispensers of medicines, with proper restrictions respecting labels whether in the shop or warehouse, or when sold, would be more effectual as a security to the public than a complicated system of registering every pennyworth of poison sold, with troublesome regulations respecting witnesses, angular bottles, and other provisions, either impracticable or so vexatious as to be inoperative.

On the following day (Feb. 3) Mr. Walpole asked leave of the House to bring in a Bill "To regulate the Keeping and Sale of Poisons." A copy of the draft Bill prepared by the Council was therefore forwarded without delay to the Home Office, with a request for the favour of an interview, which was granted on Monday, February 7th. Mr. Walpole stated that his present Bill had no reference whatever to qualification, or to distinctions as to the parties who deal in poisons, being simply an Act to regulate the keeping and the sale of poisons. Care had been taken to expunge those provisions in the former Bills which had

caused so much dissatisfaction, and which had been shown to be incompatible with the requirements of the trade. Those regulations only had been retained to which he thought no serious objection could be urged: but the further progress of the Bill after the first reading would be delayed at least ten days, in order to allow Pharmaceutical Chemists, and others interested in the question, time to consider the Bill and offer any suggestions that they might think needful. Mr. Walpole fully acknowledged the importance of regulating the qualifications of the vendors of poisons, and admitted that all Chemists and Druggists should be properly educated, but he wished to keep the two subjects quite distinct, namely, the keeping and sale of poisons, and the qualifications of dispensers of medicine. He would be prepared at a future time to bring in a separate Bill with the latter object, but had not quite made up his mind as to some matters of detail in reference to it. It was not his intention to introduce any measure calculated to supersede or interfere with the Pharmaceutical Society; on the contrary, he would be glad to make the Society available in promoting an extension of the qualification, which it had been its object to introduce.

On Saturday, Feb. 12, the Poison Bill Committee met to consider the Bill. The first impression on reading it was, that although much less objectionable than the Bill of last session, yet, if all the drugs in the schedule A were subject to the regulations imposed, some amendments must be suggested. On a further consideration of the sections of the Bill *seriatim*, the Committee arrived at the conclusion, that as the public appear to be determined to have a Poison Bill, and as both Houses of Parliament had arrived at the same determination, it would be useless, and therefore impolitic, to oppose the general principles of the Bill, which was obviously much less objectionable than any previous Bill of the kind. The chief defect in it was the omission of the only important provision in legislation respecting poisons; namely, a provision requiring the vendors of poisons to possess some knowledge as to their nature and properties. But the Secretary of State having expressed the intention to deal with that part of the question in a separate measure, having reference to the qualifications of all dispensers of medicine, it was thought advisable to limit the objections to the present Bill to the following suggestions, which were submitted to the Home Secretary on a subsequent interview on the 18th Feb. The objections were premised by a statement of the unanimous opinion of the Pharmaceutical Society, to the effect that any Bill professing to provide for the safety of the public in regard to poisons, and omitting to notice the chief source of danger, which is the sale of poisons and the dispensing of medicines by persons entirely ignorant of their nature and properties, would be in fact a delusion, and it was feared that the passing of an imperfect Bill of this kind would, by creating a mistaken notion of security in the public mind, put an end to the excitement on the subject, and thus increase the difficulty of passing a really effectual measure providing for the proper qualification of the vendors of poisons and the dispensers of medicines. An amended copy of the Government Bill, in which were embodied several sections relating to qualification which had been unanimously approved by the committee, was submitted to the Home Secretary at the commencement of the interview, in the hope that this important part of the question would be reconsidered. Mr. Walpole, however, intimated his unaltered intention to deal with the sale and keeping of poisons as a separate measure. The following suggestions were then offered with reference to the present Bill:—Sec. 4. Medical Practitioners and Pharmaceutical Chemists should be exempted from the necessity of adding the word "Poison" to the labels on their shop bottles. Sec. 5. The inconvenience of requiring every purchaser of a poison to be of full age was pointed out, especially if oxalic acid and the preparations of opium are retained in Schedule A. Sec. 8. Casks and cases of arsenic should be branded with the words "Arsenic Poison." Sec. 11. This section was objected to altogether, and especially if made applicable to the establishments of qualified Medical Men or Pharmaceutical Chemists, who would of

course claim exemption. Sec. 12. The penalties were objected to as being excessive in amount; Schedule A, oxalic acid and the preparations of opium should be excluded.

Mr. Walpole admitted the justice of some of these objections, and promised to give them all his serious attention, but could not at that time state exactly what amendments he should introduce, except with regard to the 11th section, which he would undertake to alter, as he considered the objection well founded.

The further delay of a week will afford the opportunity for other suggestions from various quarters. No Bill of this kind is likely to be palatable to the parties over whom it holds *in terrorem* a system of pains and penalties; and it is especially galling to those who have for many years adopted all the precautions in the Bill that are of any value; who have used all their efforts to promote the public safety by raising the character and qualification of the Pharmaceutical body, and who are now with others brought under the lash. But the subject has become a positive nuisance, and it is quite time that the worry and annoyance should terminate. The present Bill, although of very little use, is a less obnoxious and annoying Bill than any of its predecessors. We may hope to get some amendments introduced in Committee, and when the Bill has passed, the vexation and excitement will probably cease.

GRATITUDE FOR PUBLIC SERVICES.

The term gratitude *in politics* is usually understood to mean "a lively sense of favours expected." In private life it is supposed to relate rather to the past than the future, but in public affairs this old-fashioned notion is so modified by circumstances that it is doubtful which is the rule and which the exception. In the instance to which we are about to refer, not only have the services of the parties concerned been overlooked, but a disposition on the part of the Government has even been manifested to subject them to a system of pains and penalties, as the reward for their exertions during many years in furtherance of the public good.

The Pharmaceutical Society has done important service to the public. Long ago, when noble lords and senators were fast asleep on the subject of poisons, the founders of the Society were on the alert, and sounded the alarm. The danger of many hundreds of illiterate persons, ignorant of chemistry or pharmacy, some of them unable to read or write, selling without restriction the most deadly poisons, was pointed out, and various suggestions were offered for ensuring the due qualification of the vendors. This warning was often repeated and always unheeded, but the Society proceeded steadily in its arrangements for raising the standard of Pharmaceutical Education, and thus lessening the chief source of danger. Above eighteen years have elapsed, and a very considerable improvement has taken place in the qualification of Pharmaceutical Chemists and in their mode of conducting their business. Two or three years before the passing of the Arsenic Act, the Society issued a circular to its members throughout the country, containing a variety of questions relating to the sale of poisons, the precautions taken, the demand for certain poisons in the respective localities, the frequency or otherwise of accidental or criminal poisoning, the most common causes of accidents, with cases, and other information calculated to throw light on the statistics of poisoning.

The most striking feature in the answers, of which several hundreds were received, was the evidence they afforded of the care usually exercised by Pharmaceutical Chemists, many of the precautions being described in detail, and instances given in which accidents and crimes had been prevented by the judicious caution of the Chemist to whom application had been made for the poison. Again, the traffic in poisons of the most dangerous kind by hucksters and other general dealers in small shops or stalls in the markets, denoted a

reckless indifference resulting from ignorance, and pointed directly to the chief source of danger. The demand for poisons in different localities was so various, that it was difficult to form any general rule that could be made to apply to all; at some places oxalic acid being sold in small quantities from morning till night, in other places, laudanum and opium to a similar extent, and other poisons being largely used in the arts in some manufacturing towns. The result of that investigation was the passing of the Sale of Arsenic Act, the other poisons being at the time omitted, on account of the extreme difficulty of dealing with the entire question.

At length the House of Lords opens its eyes—the House of Commons wakes up—the Press begins to join in the cry—a few murders and suicides have taken place, and something must be done. Innocent inexperienced persons who believe in the existence of gratitude (in the old fashioned sense) in public affairs, might have expected that the authors of the first Sale of Poisons Bill would have acknowledged the services of the Society in reference to this subject during so many years, and requested its assistance in framing the Bill. No such course was adopted, but a most obnoxious Bill, with arbitrary and impracticable provisions to be enforced by pains and penalties from £5 up to the prohibition to carry on the business, was levelled at the members of the Society in common with other vendors of poisons. Upon a strong, but respectful remonstrance on the part of the Society, several members were admitted to give evidence before a Committee of the House of Lords; the result of which was a very considerable modification of the provisions in the next edition of the Bill. The noble Lords thanked the witnesses for the information, and adopted, in a certain way, their principal suggestion, which had reference to the qualification of the vendors of poisons, but evinced their gratitude to the Society for the suggestion by inserting a provision for appointing a new Board of Examiners, who should licence candidates on terms and conditions which, if carried into effect, would have superseded the Society altogether, by diverting candidates into another channel. The Bill contained other provisions of an obnoxious or impracticable character, and was very properly thrown out.

The present Bill is so much less objectionable than any of its predecessors, that we have no disposition to oppose it or offer any obstruction to its passing, should the amendments which have been suggested be introduced in Committee. At the same time, it is rather a curious instance of gratitude for public services. After about eighteen years of hard labour, constant and persevering application to the subject of poisons, and pharmacy in general, the maintenance, during the whole time, of an expensive educational establishment, the introduction of very considerable improvement in the qualifications of Pharmaceutical Chemists, and in the precautions with regard to poisons, the Society is *rewarded* by *a Bill of pains and penalties.* The Pharmaceutical Chemist is placed on a level with the huckster and the keeper of drug stalls in the market places. He is required to have a "POISON" label in capital letters on all his shop bottles containing poisons; he is subjected to the trouble of entering in a book, with all the particulars, every pennyworth of certain poisons when sold; he is liable to penalties from £5 up to £100 for any deviation from the style of label, or any other matter of detail in the Bill, and is also liable to cumulative penalties for the delinquencies of each and all of his assistants and apprentices. Lastly, he is subjected to the inspection of the police, who are to examine his pots and bottles to see that they are properly labelled. We have already stated that this section will be altered, and some other amendments will be introduced; but our present remarks apply to the Bill *in the form in which it was introduced in the House of Commons and printed.* The new power proposed to be vested in the police is rather original. The only parallel to it in natural history is the employment of pigs to hunt for truffles. The pig has a peculiar

instinct—a power of the olfactory organ enabling him to recognize truffles, even when buried in the earth. A policeman having a similar instinct for recognizing poisons would be invaluable.

The question cannot rest where it is. The Sale of Poisons Bill may appease the excitement but cannot ensure the safety of the public. No improvement in the construction of a revolver could make it a safe plaything for children, nor can any system of regulations for the keeping, labelling, and sale of poisons, make them safe in the hands of persons who have no notion of the difference between Epsom salts and oxalic acid, or between arsenic and plaster of Paris. This has been in substance often said before, and it must be continually repeated, until the evil is rectified. The object of these remarks is to give an illustration of GRATITUDE for public services which have been persevered in for nearly twenty years, and are now threatened with a REWARD in the form of a Bill of pains and penalties, comprising very inconvenient regulations, and degrading inspection. The following observations from the *Daily News* of Feb. 12 place the question of the Sale of Poisons in its true light:—

SOMETHING MUST BE DONE.

This, we suspect, is the reason, rather than any substantial advantage to be attained, why Mr. Walpole makes a Sale of Poisons Bill part of the early and urgent business of the session. In the alarm that has followed the accidents which have occurred, the crimes which have been committed, owing to the too easy accessibility of poisons, some people have cried out for fuller rules, sharper restrictions, and aggravated penalties, to guide, restrain, and punish the dealers in dangerous drugs. Last session Mr. Walpole so far deferred to this demand as to introduce to the House of Commons a Bill which might have been entitled "The Young Chemist's Guide." The configuration of the shop, the colours and shapes of the bottles, and the classification of chemicals, were all prescribed with a minute exactness which took account of everything except the character of the objects regulated, and the possibilities of trade. There were poisons arbitrarily constituted such by Act of Parliament, and limited to the little chamber of horrors which every pharmaceutist was required to set up; and again there were malignant drugs left with liberty to be at large on the general shelves. The new Bill is a great advance on that measure. A good half of its childish regulations have been knocked away. A few remain, just to remind the chemist that he is the heir of the suspicion which the Middle Ages attached to alchemy. The fourth clause, which enacts that surgeons and apothecaries shall keep certain medicines in vessels labelled not only with the proper names of their contents, but with the word "Poison" in conspicuous capital letters, must have been suggested by some member of the "British College of Health." Of a large number of the elements of the Pharmacopœia it may be said, that if they were not poisons they would not be medicines, the same properties being their title to both designations, their various operation depending simply on the mode and degree in which they are received into the system. The repulsive words are calculated to alarm the unlearned, while they will have little or no meaning for those who are enjoined to use them. But we need not dwell on this, nor on the other restrictive clauses of the measure. The chemists and druggists will probably balance what they escape against what is imposed, and not oppose this Bill, as they did the last. Probably no measure at all of a penal character could worry them less. The common-place precautions which they have been in the habit of observing will not become more troublesome by receiving the sanction of an Act of Parliament. The difficulties thrown in the way of sales of poison will diminish the number of such troublesome transactions; but, on the other hand, by inducing consumers to buy larger quantities at a time, they will increase the stores of dangerous drugs in private hands. Such are the difficulties which beset attempts to supply by rule the lack of self-acting discretion. We have always maintained that the only way to increase the security of the public is to raise and guarantee the character and qualifications of the classes to whom the dispensation of dangerous drugs is entrusted.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

AT A MEETING OF THE COUNCIL, *2nd February*, 1859,

Present—Messrs. Ballard, Bell, Bird, Bottle, Brew, Davenport, Deane, J. B. Edwards, Macfarlan, Meggeson, Morson, Peacock, Sandford, Squire, and Waugh, the following were elected

MEMBERS.

LONDON.....Charles J. Radermacher
WORCESTER.....Charles W. Lea

MAJOR EXAMINATION, *15th February.*

Tollinton, Richard B.....Stowmarket

MINOR EXAMINATION.

Davies, David.....Cardigan
Pearson, George Brigg.....Barnard Castle
Wilkinson, George.....Manchester

REGISTERED APPRENTICES.

NAMES.	RESIDING WITH	ADDRESS.
Canning, Charles W.	Mr. Keene	Leamington
Elliott, Robert	Messrs. Proctor and Son	Newcastle-on-Tyne
Hadley, Thomas	Mr. Harris	Hereford
Gillies, William Jonathan	Mr. Dunn	St. Austell
Goodwin, Medmer	Mr. Telfer	Oxford
Jones, James Davenport	Mr. Marston	Ludlow
Stokes, Walter Edward	Mr. Boully	Bayswater

ELECTION OF THE COUNCIL.

THE Lot having been taken, was declared to have fallen upon

BOTTLE, ALEXANDER, 37, Townwall Street, Dover
BUCKLEE, WILLIAM HENRY, 86, New Bond Street
EDWARDS, JOHN B., 50, Berry Street, Liverpool
MACFARLAN, JOHN F., 17, North Bridge, Edinburgh
SQUIRE, PETER, 277, Oxford Street
STANDRING, THOMAS, 1, Piccadilly, Manchester
WAUGH, GEORGE, 177, Regent Street

PHARMACEUTICAL MEETING.

Wednesday, February 3rd, 1859.

MR. W. L. BIRD, VICE-PRESIDENT, IN THE CHAIR.

THE following

DONATIONS TO THE LIBRARY AND MUSEUM

were announced:—

An Enumeration of Ceylon Plants, by G. H. K. Thwaites, from the Author.
Journal of the Society of Arts, from the Society.
Journal of the Photographic Society, from the Society.
London University Calendar, 1858, from the University.
The Assurance Magazine, from the Society of Actuaries.
The Quarterly Journal of the Pharmaceutical Society of Melbourne, from the Society.
A specimen of Scammony root, and also a specimen of pure resin of scammony prepared by a new process, from Messrs. McAndrew.
Specimens of Leech cocoons, from Mr. Allchin.
Dried specimen of Andropogon species, from Mr. Deane.

A NEW PROCESS FOR THE PREPARATION OF PURE RESIN OF SCAMMONY.

Dr. Redwood said he had been requested to bring this subject before the meeting. Some time ago, Mr. Clark, a manufacturer of extract of liquorice, residing in Turkey, had his attention directed to the very imperfect process by which scammony was collected and prepared in that country, and to the great difference which existed in the quality of the drug as met with in commerce, partly arising from the imperfection of the process, and partly from the extensive system of adulteration adopted by those engaged in its manufacture and commerce. It occurred to him, that if the roots were dug up and dried at the proper season, the whole of the resin might be extracted from them by a suitable process, and that the product thus obtained would probably be more abundant and more uniform in its properties than that obtained by the method hitherto pursued. Mr. Clark, however, was not sufficiently acquainted with chemical processes and appliances to enable him to carry out the investigation himself. Some of the roots of the scammony plant were therefore sent to Prof. Williamson, of University College, by whom a process was devised for extracting the pure resin of scammony, which formed the subject of the present communication. Dr. Williamson's process consisted in boiling the roots, first with water, and afterwards with diluted acid, by which means they were deprived of all matter soluble in those menstrua, while the resin was left undissolved. The roots were then digested with spirit, which dissolved out the resin, and from this the latter was separated by distillation. It was found that by adopting this process the resin could be obtained at a less cost than it could by extracting it with spirit or ether from commercial scammony, so that the price of the pure resin made by the new process would be about seven shillings a pound less than that of the best virgin scammony.* Dr. Williamson's process was patented, and it was being worked by Messrs. McAndrew and Sons, of King William Street, by whom the specimens on the table were presented to the Society. Extensive trials of the medicinal action of this resin had been made by several physicians, whose reports he would now proceed to read :—

REPORT ON THE ACTION OF WILLIAM McANDREW AND SONS' SCAMMONY.

BY A. B. GARROD, M.D., F.R.S., F.R.C.P.,

Professor of Materia Medica, Therapeutics and Clinical Medicine at University College, Physician to University College Hospital.

Every physician in the habit of prescribing scammony, either singly, or in combination with other purgatives, must have been struck with the uncertainty of its action, and of its liabilty at one time to produce hyper-catharsis, and at another to prove almost inoperative. This uncertainty of action is chiefly due to the great difference in the quality of the drug, and chemical analysis has shown that the resinous matter, to which its activity is due, is most varying in quantity in different samples, being occasionally as high as 86 per cent., sometimes even as low as 5. It is also a well known fact that in the country from whence it is generally procured, no little ingenuity is exercised by those engaged in its collection, in seeking different means whereby it can be adulterated, and chalk, flour, gypsum, gummy and resinous exudations from other plants, besides coarser mechanical impurities, are often contained in it in varying quantities.

To avoid this liability to adulteration, and to ensure the employment of a uniform and pure drug, it has been proposed by Mr. Clark, of Sockia, in Asia Minor, to Dr. Williamson, that the roots of the *Convolvulus Scammonia*, instead of being tapped, as in the ordinary process of obtaining scammony, should be dug up, and the drug afterwards obtained by treatment of the dried root with

* We have been since informed by the manufacturers that they are enabled to supply the pure resin at a much lower price than is here indicated.

alcohol, according to a process already made public. The physical qualities of the scammony thus prepared differ considerably from that usually seen in commerce, and from virgin scammony, being non-porous, not producing a lather when rubbed with water, and, instead of possessing a musty or sour cheese-like odour, having an aromatic and fruity smell, exactly resembling the dried untapped root. In appearance, when in thin layers, it much resembles the scammony which is occasionally seen in the small shells (and regarded as the purest form of scammony), being transparent, and of a yellow colour. In composition it is very rich in resin, being almost entirely composed of this matter in the STATE of a resinous acid. At different periods during the last two years, I have put the drug prepared by Messrs. William McAndrew and Sons to a full and severe trial, comparing it, not only with the ordinary scammony found in the hospital, the origin of which was unknown, but also with that sold at Messrs. Bell and Co.'s establishment, and with a drug named "best virgin scammony," and supplied by Messrs. Horner and Son, and I will now proceed to give a short account of the results I have obtained.

The first few were made with a small specimen sent me three years ago, and in a note written at that time to Dr. Williamson, the conclusions I arrived at are thus summed up:—"I have made trial of your scammony as far as the small specimen sent me allowed, and found it much stronger than the ordinary scammony of the hospital, which, perhaps, may be regarded as of average quality. Ten grains of the latter produced in one patient no effect, whereas the same amount of yours caused a free action of the bowels; the patient was subject to constipation. In other cases four grains acted moderately. To ascertain, however, the real value of the drug requires much more experience in its effect than the amount in my possession enabled me to obtain."

After this time, in 1857, I made the following trials; but, prior to giving the results, I should remark that some caution is necessary in drawing conclusions, not only upon the action of this, but of all other purgatives, as much depends upon the peculiarity of the individual to whom they are administered and the condition of the patient at the time, and from the results of one or even more observations the deductions cannot be depended upon. To avoid these sources of error, I have always, when practicable, administered the different kinds of scammony to the same patient, and also frequently alternated their employment. At first, the new scammony was tested with that obtained from Messrs. Bell and Co., and each was given in the form of pills made with the simple drug; the details of the effects are given in Table 1, Appendix.

It will be observed that twenty-five trials were made, fifteen with the new scammony, and ten with Messrs. Bell's, and the results are, if anything, in favour of the new scammony being somewhat the stronger of the two; most of the observations are comparative, or made with the same doses and upon the same patients, but some few were made on single cases.

The next results were obtained also in 1857 from the new scammony given as mistura scammonii, ten grains being rubbed up and suspended by means of compound tragacanth powder in each ounce of water. Of this mixture ten or eleven fluid drachms were administered to several patients, with the effects seen in Table 2, which are sufficient to enable us to conclude that it is a most powerful cathartic, in one instance producing as many as twenty-five actions on the bowels, although the same amount in other cases caused but moderate effect. Its operation was frequently attended with nausea and griping, which shows that scammony in its simple form is not so well suited for administration as when combined with other purgatives. Experience has long proved this to be the case, and in practice the fact is almost universally acknowledged and acted upon.

In November and December of 1858 I again took up the subject, and made a rather extensive series of trials with the new scammony, comparing its action with that of a specimen sent specially for the purpose by Messrs. Horner and Son, and called best virgin scammony. The drugs were given in the form of pills, and in ten-grain doses to each patient, and the effects are detailed in Table

3 (A and B). Thirty trials were made, the majority comparative, but a certain number on separate patients. From a review of the contents of the table it will be evident that the new scammony is at least equal to the virgin scammony as a purgative.

Table 4.—Exhibits a series of comparative and other trials made with the same kinds of scammony administered in a liquid form, or rather in the state of suspension, as mistura scammonii, and here again the new scammony shows itself quite equal to the virgin variety,

It next became a subject of interest to know the effects of the new scammony when given in combination with other purgatives, and the compound colocynth pill of the present London Pharmacopœia was selected as the form to be employed. Two quantities were made up with the same aloes, the same simple extract of colocynth, &c., the only difference being this—that in one the new scammony was introduced, in the other the same quantity of Horner's virgin scammony, and the pills were administered in ten-grain doses to each patient. Twenty-six trials were made, and are detailed in Table 5, and the results appear somewhat in favour of the new scammony, and there can be no doubt of its being at least equal, when in combination, to the best virgin scammony.

In Table 6, the results of some comparative trials made with Horner's scammony, and the resin obtained from the same by means of ether, are given, and it will be there observed that the scammony made use of in many of my observations was one whose quality cannot be doubted, seeing that it yielded 86 per cent. of resin soluble in ether, whereas the London and Edinburgh Colleges only demand that 78 and 80 per cent. of resin should be present. No great difference could be discovered between the two drugs, but this fact I do not think difficult to explain, as only a difference of 14 per cent. of resin existed, and, unless the trials were very numerous, this would be unable to be detected. I think it would be more easy to do so when the scammony is given in combination, than when administered alone.

From these numerous observations, one hundred and twenty in number, together with many others which have not been tabulated, I am quite convinced that the scammony prepared by the new process from the untapped root is quite equal, as a remedy, to the very best virgin scammony which is met with in commerce, and equal, in fact, to the resin which is extracted from commercial scammony by means of ether; and it possesses this most important advantage over the scammony of commerce, namely, of being entirely free from the frauds which are almost constantly practised upon it in the country where the plant grows, and in which it has hitherto been collected, and, therefore, being perfectly uniform in its physical characters, composition, and therapeutic action. There can, therefore, be no objection, but, on the other hand, manifest advantage, in employing it in place of the scammony commonly met with.

APPENDIX.

TABLE 1.

Comparative strengths of Messrs. William McAndrew and Sons' and Bell's Scammony.

McAndrew's Scammony.	*From Messrs. Bell and Co.*
S. P.—12 grains in pills produced four actions, with griping.	S. P.—12 grains in pills, produced one action, but much nausea.
C. S.—12 grains, four actions, with much griping.	C. S.—Much nausea, but no action.
M. A. W.—4 grains, produced one action, without nausea or griping.	M. A. W.—
Idem.—8 grains, produced one action, no griping.	*Idem.*—8 grains, produced two actions, no griping or nausea.
Idem.—12 grains, produced one action, with griping.	*Idem.*—12 grains, two actions, without griping.

McAndrew's Scammony.	*From Messrs. Bell and Co.*
J. O.—12 grains, three actions, without griping.	J. O.—12 grains, five actions, with griping.
Idem.—12 grains, two actions, without griping.	
E. R.—12 grains, three actions, with griping.	E. R.—12 grains, seven actions, with much griping.
J. M.—12 grains, produced no action, but much griping.	J. M.—12 grains, induced one action, much nausea.
S. P.—12 grains, one action, much griping.	S. P.—12 grains, no action, much nausea.
M. B.—4 grains, one action.	M. B.—
Idem.—8 grains, one action, with griping.	*Idem.*—
	Idem.—12 grains, produced two actions, without griping.
R. W.—8 grains, induced five actions, with slight griping.	R. W.—8 grains, produced five actions, without griping.
L. R.—12 grains, produced ten actions, without griping.	
A. C.—12 grains, twelve actions, slight nausea.	

TABLE 2.

Action of Messrs. McAndrew's Scammony, given in the form of Mistura Scammonii (10 grains to the fluid ounce).

C. S.—Fl. ʒx. of Mist. Scammonii, four actions, with griping.
J. M.—Fl. ʒxi. of Mist. Scammonii, no action, much nausea and griping.
S. P.—Fl. ʒx. of Mist. Scammonii, one action, some nausea, no griping.
P. F.—Fl. ʒx. of Mist. Scammonii, eight actions, no nausea or griping.
S. C.—Fl. ʒx. of Mist. Scammonii, twenty-five actions, much nausea and griping.

TABLE 3.

A.

Exhibiting the relative powers of Messrs. McAndrew's Scammony, compared with Virgin Scammony obtained from Messrs. Horner and Son.

McAndrew's Scammony.	*Scammony from Messrs. Horner.*
M.—10 grains in pills, acted twice.	M.—10 grains in pills, two actions.
Idem.—10 grains, two actions.	*Idem.*—10 grains, one action.
Idem.—10 grains, one action.	*Idem.*—10 grains, one action.
R.—10 grains, one action.	R.—10 grains, two actions.
Idem.—Ditto, one action.	*Idem.*—Ditto, one action.
Idem.—Ditto, two actions.	*Idem.*—Ditto, one action.
Idem.—Ditto, one action.	
N.—10 grains, one action.	N.—10 grains, one action.
	Idem.—Ditto, one action.
C.—10 grains, one action.	C.—10 grains, one action.
Idem.—Ditto, one action.	*Idem.*—Ditto, one action.

B.

Miscellaneous trials of the two kinds of Scammony, each given in 10-grain doses.

B.—One action.	H.—Two actions.
G.—One action.	J.—Four actions.
C.—One action.	M.—Three actions.
N.—Five actions.	
R.—Two actions.	
C.—One action.	
H.—One action.	

TABLE 4.

Exhibiting the relative strengths of the two kinds of Scammony, when administered in the form of Mistura Scammonii; each fluid ounce containing 5 grains of the drug.

McAndrew's Scammony.	*Horner's Virgin Scammony.*
P.—Fl. ʒj., no action.	T.—
Idem.—Fl. ʒj., one not very free action.	
S.—Fl. ʒj., one free action.	S.—Fl. ʒj., one action, not free.
D.—Fl. ʒj., one free action.	D.—Fl. ʒj., two free actions.
M.—Fl. ʒij., three very free actions.	M.—Fl. ʒij., two free actions.
	P.—Fl. ʒj., no action.
	S.—Fl. ʒj., one action.

TABLE 5.

Action of the Compound Cylocynth Pill, made with McAndrew's and Horner's Virgin Scammony, the other ingredients being exactly alike.

Made with McAndrew's Scammony. Given in 10-grain doses.	*Made with Horner's Virgin Scammony.* Given in 10-grain doses.
C.—Three pretty free actions.	C.—One action.
Idem.—Two actions.	
N.—One action.	N.—One action.
Bl.—Violently.	Bl.—Four actions.
V.—Two free actions.	V.—Four actions.
Idem.—Four free actions.	*Idem.*—Four free actions.
Bu.—Violently.	Bu.—Two free actions.
G.—Three free actions.	G.—Three free actions.
H.—Two free actions.	H.—Two actions.
F.—One action.	F.—One free action.
M.—No action.	M.—No action.
T.—Four free actions.	
K.—Violently.	
R.—Violently.	
E.—One free action.	
P.—Two free actions.	

TABLE 6.

Comparative strength of Horner's Virgin Scammony, and the pure Resin obtained from the same; $\frac{86}{100}$ of Resin was yielded to Ether.

Virgin Scammony. In 10-grain doses (pills).	*Resin of Scammony.* In 10-grain doses (pills).
B.—Two free actions.	B.—Two free actions.
C.—Four very free actions.	C.—Three free actions.
P.—One action.	P.—One free action.
	Idem.—One action.
V.—One free action.	V.—Three free actions.
J.—Three free actions.	
H.—One free action.	H.—No action.
M.—No action.	
	Bu.—One action.
	G.—One action.
	N.—Two free actions.

REPORT FROM DR. FRED. J. FARRE.

7, *Montague Street, January* 31, 1859.

Dear Sir,—I have scarcely had sufficient time to make a fair trial of your resinous extract of scammony, but as you intend to introduce it to the Pharmaceutical Society next Wednesday, I send you the result of all the trials I have made both of the resin and of the virgin scammony from Mr. Horner's, which you furnished at the same time for comparison. The virgin scammony was of fine quality, presenting all the qualities of the best scammony.

Case I.—*W. Scott*, a tailor, troubled four years with habitual constipation. Bowels often confined two weeks at a time.

He was ordered to take aloes, calumbo and ginger, and a basin of oatmeal for supper. This treatment had been continued a fortnight with only slight benefit, when I received the scammony.

Jan. 17.—I ordered ten grains of *scammony resin* rubbed in a mortar with milk, to be taken in the evening. It was taken at 7.30, and operated at 9.30, and three times subsequently, till 12, without any griping. The motions were at first scanty, afterwards more copious.

Jan. 19.—The bowels not having acted since the 17th, I ordered ten grains of *virgin scammony* rubbed up with milk. The bowels acted, an hour after taking the scammony, three times, and more copiously than before, but with griping, which continued three or four hours.

Jan. 21.—The bowels not having acted since the 19th, he was directed to take twelve grains of *compound scammony powder*, in which scammony resin was substituted for ordinary scammony. No evacuation followed, the dose being probably too small.

Jan. 23.—Ten grains of *scammony resin* were given as before in milk, and caused four evacuations with a little griping. The first motion occurred three hours after the administration of the dose, and the motions were scybalous. The second motion was more copious.

Jan. 25.—Ten grains of virgin scammony moved the bowels twice without griping, the motions being more watery than those caused by the resin.

Case. II.—*M. A. Williams*, a girl aged sixteen, admitted Jan. 20th, suffering from subacute rheumatism. The joints were painful, the tongue covered with a thick white fur, the bowels not open since the 16th, the urine thick with deposited urates. Ordered calomel, gr. ij., resin of scammony, gr. viij. Bowels acted seven times without griping or uneasiness.

Case. III.—*J. M'Leod*, a rigger from the docks, was habitually costive, the bowels never acting without medicine, and the motions being frequently hard as bullets. When admitted, the bowels had been confined three days, and there was some pain apparently from distention; ten grains of resin of scammony taken on the 25th of January, at 6.30, acted at 2 A.M., after much griping. The bowels were moved three times copiously, and he felt much relieved.

Jan. 27.—The same quantity of virgin scammony was given. The bowels were moved twice with a little griping. The resin, he says, griped most and purged him most.

Case IV.—*Mary Michell*, a woman aged thirty-three, admitted with jaundice, without pain or fever, states that her bowels are very costive. Urine loaded with bile.

Jan. 21.—Ordered calomel, gr. ij.; *scammony resin*, gr. x. Bowels not moved.

Jan. 22.—Calomel, gr. ij.; *virgin scammony*, gr. x. Bowels not moved.

Jan. 23.—Being unwilling to wait longer, I ordered ten grains of calomel, to be followed by ten grains of rhubarb and half a drachm of sulphate of potash, which acted effectually.

Jan. 25.—Twelve grains of scammony resin produced no effect.

Case V.—I have also given the *resin* to a little girl seven years old, whose bowels had been confined four days. Four grains acted well, twice, without any griping or uneasiness.

These, I think, are all the cases in which I have used the resin at present. I have generally used it alone, that the whole of the effect might be due to the resin; but even the gum resin is seldom used alone, and the resin will also, probably, act better in combination with other purgatives, as in the compound colocynth pill. In case II. its combination with calomel acted seven times without griping or uneasiness. In case IV. the constipation was very obstinate —calomel and scammony failed twice—but a *second dose* of ten grains of calomel, followed by rhubarb and sulphate of potash, also failed, and I was obliged to have recourse to injections. The principal cases, therefore, are I. and III. In these, I think, the resin and the virgin scammony acted about equally well. In the first case, both purged effectually and quickly, the virgin scammony rather the most; and each griped on one occasion, and not on the other. In the third case the resin purged the most, but it also griped the most.

As far, therefore, as I can judge from these few trials, I am of opinion that the medicinal value of the two preparations is about equal.

I am, Gentlemen, yours faithfully,

FRED. J. FARRE, M.D.,

Messrs. W. Andrew and Sons. Physician to St. Bartholomew's Hospital.

REPORT FROM DR. JOHNSON.

11, *Savile Row*, *February* 1, 1859.

During the last few weeks I have prescribed for a considerable number of patients under my care in King's College Hospital a preparation of scammony, sent to me by Messrs. McAndrew and Sons.

I have found this scammony a very active and efficient medicine in doses of from five to ten grains.

In more than one case a dose of ten and even of eight grains proved more active than was desired. Thus, a woman was purged nine times by a dose of ten grains, and a man was actively purged eight or nine times by a dose of eight grains.

In most of the cases the scammony was given in the form of powder with ginger.

About half the patients who took it said that it acted pleasantly without griping, while others complained of griping pain during the operation of the medicine. The griping appeared to bear some relation to the activity of the dose in each case.

I have endeavoured to ascertain the relative activity of Messrs. McAndrew's scammony, and of a fine specimen of commercial virgin scammony, by prescribing these drugs alternately in equal doses to the same patient. The results, according to the judgment of myself and others who have assisted me in watching the cases, is that in most instances Messrs. McAndrew's scammony has proved itself decidedly more active than the virgin scammony. As to pleasantness of operation, or the reverse, there seemed to be no choice between the two specimens.

That a preparation of scammony should be a little more or a little less active is of comparatively small importance. It is far more important that the drug should have a fixed and uniform composition and activity, so that the prescriber may know, with an approach to certainty, what doses are required to produce a given effect. This advantage of uniform activity Messrs. McAndrew's scammony seems likely to possess over the scammony which has hitherto been in common use, and which is a drug notoriously of most uncertain composition and power.

GEORGE JOHNSON, M.D., F.R.C.P.,
Professor of Materia Medica and Therapeutics in King's College,
Physician to King's College Hospital.

REPORT FROM DR. R. D. THOMSON.

St. Thomas's Hospital, *8th December*, 1858.

I have carefully examined a sample of scammony, described to me as having been extracted from the root of the plant by Dr. Williamson's process. I find it to possess all the characters of the pure extract of scammony. It contains neither starch nor chalk, which are almost always present in commercial scammony; and it is completely soluble in alcohol. I consider it to be a very valuable preparation.

R. D. THOMSON, M.D., F.R.S.,
Examiner in Chemistry at the University of London,
Lecturer on Chemistry at St. Thomas's Hospital.

Mr. DAVENPORT remarked that the odour of the resin prepared by Dr. Williamson's process was totally different from that of the ordinary commercial

scammony, and even from the resin extracted from commercial scammony by means of spirit. He thought the smell of the new resin resembled that of resin of jalap.

Dr. Garrod said the smell of the new resin was very similar to that of the freshly cut root, and he thought the odour of commercial scammony was due to some change having taken place in some of the constituents of the juice during the process of drying, giving rise to the formation of some volatile odorous substance resembling butyric acid.

Dr. Farre said that when he first smelt this resin he thought it very different from true scammony, but upon comparing it with specimens of the best virgin scammony, he found there was much resemblance, the cheesy smell being absent in both, but especially in the new resin.

Dr. Johnson considered the smell of the resin to be very similar to that of the root, but certainly different from the ordinary commercial scammony.

Professor Bentley considered it very important that we should be able to obtain a scammony of uniform quality. The process certainly appeared to be an economical one, as a much larger quantity of resin would of course be obtained by treating the roots with spirit in the manner described than could be procured by spontaneous exudation in the old way. There was one very important point, however, and that was, could a sufficient supply of the roots be ensured, and what security would there be that spurious roots would not be mixed with them? Why might not false roots be sent as well as adulterated scammony? With regard to the medical activity of the new resin, he should have expected to find it less satisfactory than good scammony of the old sort. He agreed with former speakers that uniformity of strength was more important than amount of strength. The questions of strength and mode of action were pretty well disposed of by the reports which had been read. With regard to the commercial question, he was disappointed to find that a greater reduction in price was not likely to occur. Looking at the productive nature of the process as compared with the old method, he thought the manufacturer ought to be able to produce it at a lower price than had been mentioned, and he doubted, if the price was not reduced, whether it would to any extent replace the scammony now in use.

Dr. Arthur Leared said he was more interested in the medical than the commercial question, but having been for some time in the locality where scammony was produced, he had observed that, after cutting the roots and collecting the resinous exudation, the roots were left in the ground to yield a further supply. He thought, therefore, that the digging up of the roots would not be the most economical mode of proceeding.

Mr. Squire said it had also occurred to him that in the proposed process it would probably be found that they had killed the goose for the sake of the egg. He doubted also whether the product obtained by this process would be as good as that obtained by exudation. He thought the natural juices of plants formed more valuable medicines, or at least differed in their properties from extracts made from the same plants. Thus, lactucarium was a very different thing from extract of lettuce.

Mr. Maltass was well acquainted with the collection and preparation of scammony in Turkey, and he was convinced that while the mode of collecting it continued as at present, the best virgin scammony could not be supplied for much less than forty shillings a pound, but at this price any quantity of good scammony could be obtained. The only obstacle to the supply of good scammony had always been the difficulty of getting the price at which it could be produced. There was a large quantity of scammony now in London which was unsaleable on this account. He did not agree in thinking that there would be any loss of product from digging up the roots. After they had been cut for the extraction of the scammony in the old way they always died.

Mr. Bentley confirmed the last statement, observing that the plant was

perennial, and the root would inevitably die after being cut to allow the scammony to exude from it.

Mr. McAndrew said there was no doubt that an abundant supply of the roots could be obtained for making any quantity of the resin that was likely to be required.

Dr. Farre, referring to a remark made by a previous speaker, said he thought it much more likely that scammony, and even the resin of scammony, should be adulterated than that false roots should be supplied. He did not see what security there would be, if the resin should be substituted in medical practice for the scammony now used, that adulteration should not be practised as much as it was at present.

Dr. Garrod thought the tests for resin of scammony were so good and so easily applied that frauds could not fail to be soon detected.

Mr. Davenport thought some further evidence than had yet been adduced was required to prove that the resin made by Dr. Williamson's process was identical with that contained in commercial scammony. They knew that the inspissated juices obtained by making incisions into living plants often differed materially from anything that could be obtained from the plants in any other way. Not only did lactucarium differ from extract of lettuce, but opium differed entirely from anything that could be obtained from the capsule of the poppy after being separated from the living plant.

Dr. Redwood referred to the reports which had been read, which went to show that the medical properties of the new resin were the same as those of the best samples of commercial scammony. The new resin also agreed very closely with that contained in commercial scammony in physical and chemical characters, which could not be said of opium and extract of poppies, or of lactucarium and extract of lettuce.

Mr. Squire wished to ask Professor Williamson if he had submitted the resin made by his process, and that obtained from commercial scammony, to analysis, so as to ascertain whether they both had the same composition.

Dr. Williamson said that if Mr. Squire alluded to an ultimate analysis, he did not think that such a mode of examination would be at all appropriate. These resinous substances usually consisted of more than one sort of resin mixed together in somewhat varying proportions, and he could not be sure that the resin obtained from two roots, if submitted to ultimate analysis, would give the same results. He thought the application of chemical tests, of which there were several, afforded much more satisfactory means of ascertaining whether the resins obtained by the two processes which had been referred to were practically the same. He might state, with reference to the questions which had been asked, as to the probability of obtaining a sufficient supply of the roots collected at the proper season and unmixed with other roots, that no doubt need be entertained on these points, as there was an establishment in Turkey with which the manufacturers were connected, and where complete arrangements were made for ensuring a regular supply.

NOTES ON SEVERAL PREPARATIONS OF THE PHARMACOPŒIA.

BY MR. JACOB BELL.

The Pharmacopœia can only be effectually revised and discussed by selecting from time to time such preparations as appear to require amendment, and considering each *seriatim* on its own merits. When subjects of this nature are introduced to the notice of the Members, it is generally the case that some practical information is elicited, not of necessity in the first discussion, but more frequently after time has been allowed for reflection, and in some instances, for experiments in elucidation, or in support of any proposed improvements. In selecting a few preparations for consideration with this object, it is not my aim or intention to

forestal the opinions of the Members by exhausting each subject and suggesting definite conclusions; but, the object is to state each case in a convenient form for discussion, in the hope that the Members of the Society will, as on former occasions when appealed to, come forward with practical remarks founded on their own experience, and that thus the opinion of the Society may be obtained.

Spiritus Ammoniæ Aromaticus.—This is one of the most unsatisfactory preparations in the Pharmacopœia. It is, as a domestic medicine, very extensively in demand, scarcely a house (above the poorest classes) being unprovided with it. For more than a century and a half it has been in use, and is to be found, with slight variations, in at least six consecutive Pharmacopœias. Yet few preparations are less uniform in their composition. In the first place, the formulæ of the three Colleges differ materially, and some of these being open to objection, are more or less superseded by analogous preparations, which, under the name of spirits of sal volatile, have acquired a reputation in different localities, and, being preferred by the public, are often used instead of the officinal compound. The object and intention of this medicine is to furnish a convenient and palatable mode of administering ammonia as a stimulant combined with aromatics. The formula of the London College orders hydrochlorate of ammonia and carbonate of potash, bruised cinnamon and cloves, and lemon peel, to be distilled with rectified spirit and water, the result being a solution of carbonate of ammonia in proof spirit, flavoured with the essential oils of the other ingredients. The Edinburgh Pharmacopœia orders a mixture of spirit of ammonia (not of carbonate) with the oils of lemon and rosemary. The Dublin formula is also a solution of ammonia in spirit, flavoured with the oils of nutmeg, cinnamon, and lemon. It must shortly be decided which, if any, of these three preparations is to be retained; and if a new and improved formula is to be substituted, it is desirable that it should be one so free from objection, as to furnish no pretext for any deviation. When prepared according to the present London Pharmacopœia, it does not give satisfaction to the public, and does not answer the description contemplated or supposed to be intended by the authors of the Pharmacopœia. It is generally understood to be a colourless liquid, and it is so when first distilled, but in the course of a few weeks it gradually acquires a brownish tint, which increases in depth until it would no longer be recognized as spirit of sal volatile. Consequently, the purchaser, observing the change in appearance, brings it back to the Chemist, complaining that it is not good. Of course it must be changed for some which has not acquired the brown tint. It is also necessary to avoid a constant repetition of the annoyance by furnishing a sal volatile not liable to this contingency, which is easily done by omitting the cloves and cinnamon, and substituting oil of nutmeg or some other unobjectionable aromatic. Many persons have a very strong objection to cinnamon, and therefore the sal volatile prepared with the above alteration is generally much preferred. As a domestic medicine, the Chemist is, of course, at liberty to make any modification of the formula in the Pharmacopœia, selling as his own preparation that which he considers to be an improvement. But, in the present instance, a difficulty occurs, as spirit of sal volatile is considered identical with the spiritus ammoniæ aromat. of the Pharmacopœia, and it is inconvenient to keep two preparations, one for sale for domestic use and the other for prescriptions, especially when it happens, which is not unfrequently the case, that the orthodox preparation is not liked so well either by patients or medical men. Hence the Pharmacopœia preparation is gradually superseded, and remains neglected on the shelf, becoming a shade browner and a trifle weaker month after month, until it is rejected altogether as unfit for use. In this manner deviations from the Pharmacopœia sometimes originate in experiments which, proving satisfactory, in process of time take the place of the original compound, in obedience to the demand of the public, and sometimes also of the profession. Formerly the Chemist had no regular access to the authors of the Pharmacopœia, and suggestions from individuals on such subjects had little or no influence.

The only alternative then consisted in improving on the formulæ of the Pharmacopœia, by which means some Chemists have acquired a reputation, and an extensive demand for the preparations thus improved. Another course is now open to those who find any of the instructions in the Pharmacopœia defective or the formulæ practically objectionable. The Pharmacopœia Committee and the meetings of the Society afford the opportunity of considering and comparing the merits of all proposed improvements, and it should be an object of ambition with each Member to contribute such information as he may think likely to be useful.

Vinum Ferri.—When carefully prepared with wine of uniformly good quality, this is a very useful medicine, especially for children. It has occasionally been brought into disrepute by its want of uniformity as met with in different shops, arising from the variable quality of the wine with which it is made. The attempt in the Pharmacopœia of 1824 to improve it by the substitution of diluted spirit and tartarized iron, for wine and iron filings, or wire, was an entire failure, the compound thus prepared having lost the characteristic agreeable flavour of the steel wine, and being also liable to speedy decomposition. It was therefore found advisable to revert to the old preparation, but this might be improved by regulating the quantity of tartarized iron, so as to keep the strength uniform, instead of allowing this to be influenced by the variable quantity of acid contained in the wine.

Pilula Colocynthidis Composita.—Very little need be said about this preparation, as its merits and demerits have been fully discussed at previous meetings of the Society. It is desirable, however, not to lose the advantage of the discussions which have taken place, and it is here mentioned, with a view of refreshing the memory of the Members on the subject. The inconvenience of having three distinct preparations under the name of compound colocynth pill, will of course be discontinued. We may also hope that the compound extract of colocynth will be restored. This preparation continues to be in regular demand; it is prepared without difficulty, and is satisfactory and uniform in its effects. The pill intended as a substitute is on the contrary wastefully expensive in the process employed, without any advantage in the result. It is also generally considered to be griping and uncertain in its operation. Consequently, it is rarely in demand. If a "compound colocynth pill" is to be retained in the Pharmacopœia, the Edinburgh formula would probably be the best. This is almost identical with the pilula e colocynthide cum aloe of 1746, which was regularly kept by many Chemists in England as well as in Scotland prior to 1851, under the name of "compound colocynth pill," and is the original formula for the old "pilecotia." It is also more correctly called a "pill," than that of the London Pharmacopœia of 1851, which is, *in fact*, a "*compound extract*," in spite of any other name that may be given to it, containing as it does *extract* of colocynth, *extract* of aloes, scammony (also a kind of *extract*), with cardamoms and soap as accessories.

This, however, is not the only instance in which the nomenclature of the Pharmacopœia is peculiar and not referable to any fixed principle of chemistry or philosophy. The spiritus camphoræ (which is a solution of a concrete essential oil in rectified spirit of wine) was, in 1836, called tinctura camphoræ for no valid reason hitherto assigned, but with this result, that it is liable to be, and not unfrequently has been, confounded with the compound tincture of camphor (or paregoric), and patients have been annoyed by receiving one when the other was intended, a casualty which never could have occurred if the familiar and more correct name of spirit of camphor had been retained. Compound spirit of lavender, which is spirit of lavender with some additions, making it a compound, was, at the same period, transferred to the tinctures, the case being considered analogous with that of tinctura valerianæ composita, more accurately described under the former name of tinctura valerianæ ammoniata. But accuracy of description is not always the object, for the name of pilula

saponis cum opio was changed to pilula saponis composita, in order that patients might not see the word opium in the prescription, and therefore be afraid to take the medicine. The same reason was assigned, among others, for changing the name of calomel, which patients began to be afraid of; and liquor arsenicalis was called liquor potassæ arsenitis, that the prescriber might not alarm his patient with the word arsenic, but order liq. potass. a. This argument sounds rather strange to our ears at the present time, when it is even proposed to enforce by Act of Parliament the use of square or grooved bottles for such preparations, that the patient may not only know, but be constantly reminded of the fact that the medicine contains poison. But the change in the name of liquor arsenicalis has another disadvantage, which is, that it assimilates it with liquor potassæ, a comparatively safe medicine, which, by the addition of the letter *a* in a prescription is transformed into the arsenical solution. The letters *ana* or *aa* (of each) might occur after liq. potassæ; in this and other ways a mistake might easily occur. But the liability to confound one medicine with another on account of the similarity of names appears to have been very much overlooked in the Pharmacopœia—for example: acidum muriaticum, and acidum prussicum, were perfectly safe and unmistakable names, but in 1836 the former was called acidum hydrochloricum, and the latter acidum hydrocyanicum, consequently acid. hydroc., which we frequently see in prescriptions, means either hydrocyanic or hydrochloric acid. Again, for many years an ointment was known and continually prescribed under the name of unguentum crætæ comp.; chalk was the peculiar and distinctive feature, but it contained also lead plaster among other ingredients. In the Pharmacopœia of 1836 this ointment was introduced as unguentum plumbi compositum. We had already two analogous preparations of lead, now we have three, namely, ceratum plumbi comp., ceratum plumbi acetatis, and unguentum plumbi comp., requiring a constant effort of memory to prevent confusion, and the texture and nature of the preparations being very different, while the names are similar, the patient is liable to much annoyance in case of accident. In changing the name of tartar emetic "antim. tart.," for antimonii potassio-tartratis, and making a similar change in the name of soda tartarizata, the object was to describe with accuracy the chemical nature of the compounds, regardless of the inconvenience of writing such long names in prescriptions. For the same reason (namely, chemical accuracy), oxide of bismuth has been called nitrate, subnitrate, and trisnitrate; calomel has also undergone many changes, and is now running so fast into corrosive sublimate, that it has been found necessary to stop. The idea of adhering to a scientific nomenclature is, however, exploded as being not only impracticable, but extremely inconvenient and dangerous, from the continual changes that occur as the progress of discoveries in chemistry gives rise to new theories and systems of description. It is therefore a very important question, and one in which the Chemist takes especial interest—on what principle will the names of the substances and the preparations in the new Pharmacopœia be regulated? To the dispensing Chemist there is but one object to be desired, which is that the names shall be *intelligible and not liable to be confounded with one another;* and it should be borne in mind as the primary requisite, that the orders and intentions of the prescriber shall be so expressed as to admit of no doubt or uncertainty in their interpretation. This view of the question is naturally uppermost with the Chemist—not so with the author of the Pharmacopœia, with whom the equally natural impression is the fact that the publication of a new Pharmacopœia makes all previous editions *legally* obsolete. That it is not so in practice, every Chemist finds out to his no little perplexity and inconvenience. It is an old grievance, and has been frequently alluded to in the *Pharmaceutical Journal.* In the Journal for November, 1850, the following observations occur, which, although written by myself, it may probably be allowable to quote, as being appropriate, and showing that the subject has been for many years a source of complaint:—

"Every ambiguity in a prescription is a trap for the Chemist. It may be compared to a sign-post, pointing between two roads, one of which terminates in a ditch. Some medical men adopt the new system, others adhere to the old." * * * *

"The authors of Pharmacopœias have no sympathies with dispensers. They never stood behind a counter with an ambiguous prescription in hand, asking themselves these questions: 'Was it written in England, Scotland, or Ireland? Was it written before a certain date or after? Was the author of it one of the old school or the new?' On the answer to these questions may depend 100 per cent. in the strength, 25 per cent. in the measure, or 10 per cent. in the weight. The nature and composition of the preparation may be entirely different in each case, yet the prescription was written with a specific object, adapted to a particular constitution, and the dispenser is bound by law to prepare it faithfully."*

Syrupus Papaveris.—Although boiling water is ordered to be used in making this syrup both in the London and Edinburgh Pharmacopœias, the advantage of cold maceration has been repeatedly pointed out, and this modification of the process is adopted by some pharmaceutists with a satisfactory result. Percolation under pressure has also been found an improvement. This subject, therefore, is one on which it is desirable to obtain the opinion of the Members.

Ceratum Plumbi Compositum.—This preparation has been referred to incidentally during the discussion on unguentum cetacei, and it has been suggested that white wax might be used in this instance with as much propriety as bleached oil in the ointment. It has also been observed that there would be an advantage in the alteration, as the cerate when yellow wax is used becomes gradually bleached, and during the process it has a mottled and unsightly appearance, the parts exposed to light and air becoming bleached first. The two cases, however, are not parallel, as the Pharmacopœia specifies *two* kinds of wax, cera (or bees' wax), and cera alba (white wax). In the ceratum plumbi comp. the former is ordered. With regard to the proposal to improve the cerate by the substitution of white wax, opinions may differ. Having frequently used this ointment and observed its effects, both yellow and white, I have no hesitation in giving the preference to the cerate fresh made with yellow wax. As a lip salve (although not *couleur de rose*), it is one of the most useful applications. When made with white wax, or when it has been kept so long as to become white, it is quite a different preparation, and less agreeable and efficacious.

Unguentum Hydragyri Nitratis.—Some discussion took place in the year 1841 on the subject of this ointment, which, before that time, was usually met with in a hard state, nearly the consistence of adhesive plaster, and also of a dingy yellowish-grey colour. It is now generally understood that the success of the process depends on carefully regulating the temperature, saving the fumes of nitrous acid while acting on the mercury, instead of allowing them to escape, and keeping the ointment constantly stirred until cold. The strength of the acid also requires careful attention, as the quantity ordered in the Pharmacopœia is not at all more than is absolutely requisite, and if this should happen to be short of the proper strength, the result would not be successful. It may be worthy of consideration whether a slight increase in the proportion of acid in the formula would not be an improvement, and some experiments have shown that a better result is obtained by the use of a portion of nitrous acid.

Mistura Ferri Composita.—It is an obvious oversight in the London and Dublin Pharmacopœias that the myrrh is ordered to be used in powder. The elegance and perfection of the preparation depend on the selection of a sound piece of myrrh, not at all dry, and which, when carefully rubbed down, makes a good emulsion.

Mistura Gentianæ Composita.—The avowed object with which this preparation was originally introduced, was for the convenience of having it ready prepared when wanted, for which purpose the tincture was added to the two

* *Pharmaceutical Journal*, vol. x., p. 215.

infusions, to retard decomposition. It would be a good practical question to ask the Members of the Society whether they or any of them keep this mixture ready, whether it is frequently or ever prescribed, and if not kept ready, whether it would not be less trouble to prepare the infusions when wanted, than first to prepare a supply of the mistura gentianæ composita, then use as much as may be wanted and throw the rest away? This is one of the instances in which the Chemist is better able to judge of the utility of a preparation than a medical man. The question has no reference to medicinal effect, for the prescriber can order *ad libitum* all or any of the ingredients at discretion; but the question is, What is the use of encumbering the shelves of the Chemist with arbitrary mixtures of ordinary preparations, which would be more conveniently ordered in extemporaneous prescriptions, in any proportions the prescriber might direct in each case? A not improbable motive for introducing preparations of this kind, appears to be to enable a prescriber to write in *one* line what would otherwise have required *three*—an advantage highly appreciated by some practitioners, who are now constantly in the habit of ordering hospital *formulæ* for mixtures, &c., instead of writing a regular prescription. This practice is far from commendable, and is liable to entail great inconvenience on the patient, as the Chemist may very probably not possess the Pharmacopœia of the hospital to which the prescriber is attached.

Another illustration may be mentioned of the practical inconvenience arising from this source. The Pharmacopœia of Guy's Hospital contains a *pulvis bismuthi compositus*, composed of nitrate of bismuth and compound powder of tragacanth. The Pharmacopœia of the Cutaneous Institution also has its *pulvis bismuthi compositus*, a compound of trisnitrate of bismuth, chromate of lead, carmine, and vermilion. The one preparation is intended for internal, the other for external administration. The one has been known to be substituted for the other.

Dr. Farre said, that feeling in some degree responsible for changes which had been made in the London Pharmacopœia, and to which Mr. Bell had referred, he wished to make a few remarks. With reference to *Spiritus Ammoniæ Aromaticus*, the process of the Pharmacopœia was based upon information obtained from Apothecaries' Hall. Several formulæ were tried, and although that which the College had adopted yielded a product which was certainly subject to the objection of its changing colour when kept for some time, yet it was the best that had been submitted to them. He did not consider the defect alluded to of much importance, but, if thought desirable, a note might be added to the formula, stating that such a change occurs. With reference to *Vinum Ferri*, the substitution of spirit for wine, in a former Pharmacopœia, was certainly an error. The proposition to substitute a definite quantity of tartrate of iron for the uncertain quantity formed by the action of wine upon iron was worthy of consideration. He could not see the force of Mr. Bell's remarks on the name *Pilula Colocynthidis composita*, as he considered it more properly a pill than an extract, being a mixture of extracts and other ingredients such as enter into the composition of pills. He thought the extract of colocynth contained in it might probably be replaced with advantage by powdered colocynth. The attempt to introduce a scientific nomenclature into the Pharmacopœia had not proved successful, indeed the attempt may be considered to have been abandoned. It was this attempt, however, that had led to the substitution of the name *Liquor Potassæ Arsenitis* for that of *Liquor Arsenicalis*, and not, as Mr. Bell appeared to suppose, a wish by such means to conceal from the patient a knowledge of what it was.* In other cases the motive referred to by Mr. Bell had suggested

* This was a generally received opinion twenty years ago; it is referred to in an article on the inconvenience of the changes in the Pharmacopœia of 1836, in the *Lancet* of Feb. 11th, 1837, where it is remarked that "Liquor Mineralis Fowleri" is the term used when secresy is an object, and no other synonym was desirable.—J. B.

the names adopted, as in the cases of *Pilula Saponis composita* and *Pilula Styracis composita*. In answer to Mr. Bell's objection to the formula for *Mistura Gentianæ composita*, he might state that this and some other formulæ had been introduced, not so much with the view of having the preparations kept ready made as for the convenience of the prescriber, who could order in a few words what otherwise would involve the writing of a formula.

Mr. D. Hanbury said he was surprised to find that Mr. Bell considered the name *Liquor Potassæ Arsenitis* had been adopted for the purpose of concealing from the patient the fact that the preparation contained arsenic, as this was implied almost as much by one name as the other.

Dr. Edwards thought the nomenclature to be adopted in the Pharmacopœia was a subject which demanded serious consideration, and ought to be fully discussed. He understood that changes were to be made in the new Pharmacopœia, but he hoped there would be no attempt made to reconcile the names of chemical compounds to modern theories, some of which, if adopted, were calculated to create great confusion, and even to cause danger.

Dr. Garrod said allusion had been made at this meeting, and on other occasions, to changes which it was stated were to be made in the forthcoming Pharmacopœia. Certain names it had been said were to be adopted, certain substances omitted from, and others introduced into, the new work. Now, as a member of, and more especially as secretary to, the British Pharmacopœia Committee, he wished most emphatically to state that all reports upon such subjects were entirely without foundation, as nothing had yet been decided; but, even if they were decided, it would be very undesirable that the proceedings of the Committee should be made public before the completion of the work upon which they were engaged.

Dr. Farre concurred with the remarks just made. The question of the names to be used in the new Pharmacopœia had not even been discussed by the Committee.

LINIMENTUM SAPONIS.

Mr. Henry Deane submitted to the meeting the results of the experiments he had undertaken to make on the subject of soap liniments, and which he thought would enable them to dispose of the questions which had arisen with reference to the formula for this preparation. In the previous experiments it had been assumed that the Colleges intended, in ordering a certain quantity of soap with the other ingredients, that a sufficient temperature should be used to effect the solution of the soap. He had macerated the ingredients at a temperature ranging from 90° to 100° Fah., which was not a higher temperature than frequently occurred in warm summer weather, and under these circumstances the soap was dissolved, but the liniment, if made with hard soap, was always liable to undergo some degree of gelatinization in cold weather. It was suggested by Mr. Squire that this would probably not be the case if the ingredients were macerated at a lower temperature. He had accordingly made the liniment by the London and Edinburgh processes, using both white and mottled Castille soap, and macerating the ingredients at temperatures not exceeding 70° Fah., and he was now fully convinced that the process of the London College afforded a perfectly satisfactory product when conducted in that way. The whole of the soap was not dissolved when the temperature was kept below 70°, but the dissolved portion appeared to consist principally of oleate of soda, while most of the margarate of soda was left undissolved.

He had made experiments in the following way:—Six hundred grains of mottled, and the same quantity of white Castille soap, were respectively macerated in twenty fluid ounces of spirit, of the strength ordered in the London Pharmacopœia, at 50° Fah., and the res ults were as follows:—

	Mottled Soap.	White Soap.
Matter undissolved	82 grains	100 grains
Specific gravity of solution	.886 "	.885 "
Dry soap in one fluid ounce of the solution	51 "	47½ "

Similar experiments were made with rectified spirit, as ordered in the Edinburgh Pharmacopœia, the results of which were—

	Mottled Soap.	White Soap.
Matter undissolved	300 grains	320 grains
Specific gravity of solution	.859 "	.857 "
Dry soap in one fluid ounce of the solution	29 "	23 "

The solutions thus made were cooled down to 35° without any of the soap separating in the gelatinous state; when the temperature approached 32°, the solution became cloudy, and at 25° they were solid. They became again perfectly liquid and transparent when the temperature was raised to 60°.

The portions of the soap which remained undissolved in the foregoing experiments were subsequently examined. Thus the eighty-two grains of insoluble residue from the first experiment with the mottled soap, were dissolved, with the aid of heat, in three fluid ounces of rectified spirit, and formed a solution which, at 100° Fah., became a solid semi-transparent jelly. Similar results were obtained on treating the other residues in the same way. It was thus evident that the gelatinization of soap liniment was due to the presence of margarate of soda which is dissolved when the temperature at which the liniment is made is above 70°, but is not dissolved, at least to a sufficient extent to cause gelatinization, when the temperature is kept below 70°. The spirit slightly diluted as ordered in the London Pharmacopœia, appeared to be a much better menstruum than the rectified spirit ordered by the Edinburgh College, as it dissolves and holds in solution a larger quantity of soap. The mottled Castille soap also appeared to be better suited for making the liniment than the white soap, as it contained a larger relative proportion of oleate of soda. He found that the mottled soap contained less than 1½ per cent. of oxide of iron, but it was a curious fact, that the white soap yielded a solution as dark coloured as that obtained from mottled soap. In conclusion, he wished to express his opinion, founded upon all the experiments he had made, that the process given in the present London Pharmacopœia was that which ought to be adopted for making soap liniment, with a slight modification to the effect, that the maceration should take place at a temperature not exceeding 70° Fah.

PHYTOLOGICAL SOCIETY,

IN CONNEXION WITH THE PHARMACEUTICAL SOCIETY.

The Sixth General Annual Meeting was held on Wednesday, January 12, 1859,

ROBERT BENTLEY, F.L.S., PRESIDENT, IN THE CHAIR.

The Chairman said that during the past year the difficulty of maintaining the interest in the proceedings of the Society had so much increased, that the Committee had felt it their duty to communicate with the Members generally, with a view of eliciting their opinion as to whether it would be desirable to dissolve the Society. A copy of the following resolution had consequently been sent to each of the Members :—

"That the difficulty of maintaining the interest of the meetings of the Society, and of keeping up the system of exchange of specimens, has of late come prominently before the Committee, which is of opinion that, unless an increased interest be manifested by the Members generally in the proceedings of the Society, steps must be taken for its immediate dissolution."

Several answers have been received by the Committee, who have carefully considered the subject, and he was happy to state that the following resolution had been passed that evening :—

"That this Committee having heard the opinion of the Country Members, and after mature consideration, think it desirable to continue the Society, and endeavour

by an alteration in the proceedings, to make the meetings more satisfactory and interesting."

This result, however, had been arrived at so recently, that they were unable to prepare a written report ; consequently he had been requested to communicate the present facts verbally, and in all probability a special report would be circulated by the next Committee.

The Treasurer's report showed a balance in hand of £10 12*s.* 9*d.*

It was proposed by Mr. Braithwaite, seconded by Mr. E. Wood, and resolved,—"That this meeting is of opinion that it would be of advantage to the Members of the Society residing in London, who have comparatively few opportunities of collecting plants for themselves, to undertake the revision and arrangement of the donations received from the Country Members, while it would at the same time provide a means of carrying out the system of exchange of specimens between Members. That therefore the monthly meetings should be constituted, as far as possible, into a working committee, to meet once or twice a month, for the purpose of revising the names of the specimens, and arranging and selecting plants for the herbarium and for exchange. That the reading of papers should not be discontinued ; but that whenever sufficient matter was obtained, notice should be given, and a meeting held for the purpose ; and that, moreover, specimens might be exhibited, and short communications made, at the ordinary meetings."

The thanks of the Society were voted to the Council of the Pharmaceutical Society for the use of their rooms, and to the Editor of the *Pharmaceutical Journal* for the insertion of the reports of the meetings.

The following officers were then elected for the ensuing year :—

President, Robert Bentley, F.L.S., ; Vice-Presidents, Jacob Bell, F.L.S. ; Henry Deane, F.L.S. ; T. N. R. Morson, F.L.S. ; T. Redwood, Ph.D. ; P. Squire, M.R.I. ; Treasurer, Daniel Hanbury, F.L.S. ; Curators, J. C. Braithwaite and J. Schweitzer ; Secretary, C. H. Wood ; other Members of Committee, T. Grundy, T. Greenish, H. Groves, G. Y. Sharpe, J. T. Tupholme, E. Wood.

Special Report of the Committee.—*February*, 1859.

The Committee at the last general meeting stated, that from the opinions which had been expressed, they considered it advisable to continue the existence of the Society, and endeavour, by making suitable alterations in the nature of its proceedings, to create an increased amount of interest among its Members generally. In re-entering on their duties, therefore, they deem it necessary to indicate what they conceive to be the best means of effecting this object.

By a resolution of the general meeting, it was decided that the more active London Members should be formed as far as possible into a working Committee, for the purpose of facilitating the exchange of specimens. The Committee have therefore arranged for the monthly meetings to be held half an hour earlier than usual, namely, at 8 o'clock, for the purpose of revising and arranging the plants in the herbarium, and selecting duplicates for exchange ; the ordinary business of the evening will then commence, in the event of there being sufficient matter, at half past 8, when coffee will be provided. In carrying out this arrangement, however, the Committee wish to impress upon the Members that such meetings can only be made successful and interesting by each person taking an active part in the proceedings ; they trust, therefore, that the London Members will give their regular attendance to the meetings of the working Committee, and that the country Members will lend them their active support by periodically returning parcels of plants for distribution. The Committee would further suggest that the communications suitable for the meetings need not be in the form of original or elaborated papers, but that subjects in a comparatively unfinished state might be brought forward, which would tend to invite discussion; that, moreover, the subjects of papers which have been published in the scientific journals might be occasionally discussed to advantage. They would also particularly point out, especially to the country Members, the importance of collecting information upon the popular uses of our indigenous plants; this was one of the original objects of the Society, and is one for which it is peculiarly well suited. Another department of Botany which has hitherto been somewhat neglected by the Society, but which the Committee consider it very desirable to obtain communications upon, is that of economic Botany.

The Committee beg to express their thanks to those Members who favoured them with their opinions, and, in conclusion, would strongly urge the importance of making a united effort to carry out the objects of the Society in a more successful manner than has lately been done.

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

THE NARTHEX ASAFŒTIDA: A DESCRIPTION OF THE PLANT, ITS PROPERTIES, AND USES.

BY DYCE DUCKWORTH, ESQ.

Abstract of a Paper read before the Liverpool Chemists' Association, on Thursday evening, January 20th, 1859, at the Royal Institution.

Asafœtida is, as we all know, a gum-resin. The plant from which it is obtained is of the umbelliferous order, a native of the mountainous regions east of Persia, and north of Kashmir,* which Dr. Falconer calls the head-quarters of the gum-bearing umbelliferæ, being excessively dry.

Of late, much doubt has existed as to the exact plant which yields the true asafœtida, but the question appears now to be solved. In the older botanical works, we find it set down as the *ferula* asafœtida, and according to some the *ferula Persica* is supposed to be the true plant. Rather more than a century and a half ago, Kæmpfer, a famous botanist, examined all these plants in their native soil, and the one described by him as yielding true asafœtida, he termed *asafœtida disgunensis*, not *ferula asafœtida*, and this plant appears to be exactly the same as that cultivated in 1837, by Dr. Falconer, in the Saharunpore Botanical Gardens, which he called *narthex* asafœtida—this seems to be the real asafœtida plant, and there is no proof that any other one yields the true gum-resin.

The word *ferula* is derived from the Latin *ferire*, to strike, which came to be applied to these plants from the fact that their stalks were used as rods for children, because they made more noise than did harm; the word *narthex* is synonymous with *ferula*, as it comes from the Greek *νάρθηξ*, which likewise signifies reed or cane; but the genus *narthex* differs greatly from any known species of *ferula* both in the characters of flowers and fruit, but Dr. Falconer seems to think it is allied to *ferula*.

Finding it no easy task to determine, from what has been already written on the subject, as to the exact plant, I wrote to Drs. Falconer and Balfour about it, and I cannot now do better than give extracts from their letters, which will, I think, clear up the difficulties.

Dr. Falconer says, "Kæmpfer was the first European naturalist who saw the *heeng* or asafœtida plant, in the natural state, nearly two hundred years ago, and he named it *asafœtida disgunensis*. The genus *ferula* was subsequently established by Linnæus for umbelliferous plants presenting certain characters and generally possessing a strong alliaceous fetid odour." There are about thirty-two known *ferulas*. "The materials seen and described by Kæmpfer were imperfect, he having no flowers to show, but, relying upon the odour and umbelliferous habit, the botanists of the Linnæan school jumped to the conclusion that the asafœtida of Kæmpfer *must*, in all probability, belong to the genus *ferula*.

"During a journey in Central Asia, I met with a plant which yielded the purest kind of asafœtida, and which was described by the natives as being the asafœtida plant of Khorassan, in Persia. I found the botanical characters to be wholly distinct from those of *ferula* or any other umbelliferous genus then known; and I adopted for it the name of *narthex*. On returning to Europe, I compared my materials with Kæmpfer's original specimens, and found them agree exactly, so far as comparison could be instituted. The late Mr. Robert Brown compared them also, and arrived at the same conclusion.

"Botanically considered, the distinctive characters of the two genera are very

* This region is indicated in Johnston's hygrometric map, in his physical atlas, by a belt of white.

marked ; *ferula* has three ridges of the mericarps, with several filiform *vittæ* in each, and numerous *vittæ* in the commissure ; *narthex* has only a solitary thick broad *vitta* in each *vallecula*, and a reduced number of *vittæ* in the commissure ; *ferula* has *involucra*, *narthex* has no *involucrum*, either general or partial. Botanists have agreed upon certain characters for limiting umbelliferous genera, and by these it is impossible to include under the same generic name such broad differences as the above. But, besides, the *habit* of *narthex* bearing a tall flowering stem, sheathed by broad *phyllodia* and secotine leaves, is wholly distinct from that of *ferula*. In 1838, or 1839, I sent home to the India House seeds of *narthex*, not of *ferula*. A part of these seeds was sent to Edinburgh, and in 1844, or 1845, I saw asafœtida plants grown in the Edinburgh Botanical Garden, identical in every respect of vegetation with the marked plants I had either raised from seed, or seen growing in the wild state in Central Asia. Last year the plants at length flowered. Dr. Balfour sent me fresh specimens, and specimens in spirits ; they differ in no material respect from my description.

"Balfour has rectified some trivial particulars where my materials were defective. Only one link in the chain of evidence is as yet incomplete—unfortunately the Edinburgh plants have not seeded. I had photographs sent to me from Edinburgh of the flowering plants ; they furnish no evidence against a *narthex* view, or in favour of a *ferula* view. Should the Edinburgh plants yield a mericarp differing from my description, which I am confident they will not, they will then be referred to some other nominal genus of plants, and not to *ferula*."

Up to last year the plant had never been seen in flower by any European. Dr. Falconer expected the flowers would be white, but they are yellow. The stalk of the plant is hollow.

Dr. Balfour, in his letter, says :—"I believe that Dr. Falconer's plant is the asafœtida of Kæmpfer, and that there is only one. As our plant was cut down by frost, and did not bear fruit, I was unable to draw up full characters, but I hope the other plants in the garden may ere long flower, and give me the opportunity of doing so."

The following account of the plant which flowered in Edinburgh has been lately published :—"Seeds were sent to these gardens by Sir John McNeill and Dr. Falconer, and were carefully reared by Mr. William McNab, the superintendent. Dr. Falconer thinks the fruits sent home by Sir J. McNeill were not those of *narthex*. In 1842 these seeds germinated, but the shoots merely appeared above the ground, and then seemed to die. Mr. McNab, however, did not give them up for lost. He would not allow the earth under the frame to be dug up, and determined to give them another year's trial. Accordingly, next summer, new shoots appeared, and from them the present stock of plants in the garden has been derived. Ever since that time the plants have sent up a vigorous crown of leaves in early spring, but these have withered by Midsummer, without any symptom of flowering. The crown of the roots, however, continued to increase annually, and in some of the specimens attained a diameter of four inches."

Flowers were yearly looked for until last spring, when two plants, which had been transplanted in the spring of 1857, showed evidence of flowering. Mr. McNab says, "The large plant of *narthex* was lifted from a glazed pit where it had been growing for five years vigorously. This was done on the 10th March, 1857. At the time of the removal the leaves were beginning to unfold, and continued to do so freely throughout the spring months. The plant always was protected with glass during the winter. On the 15th February, 1858, it showed symptoms of flowering, appearing at first like a large round ball of a greenish yellow colour, having a few short leaves rising from it.

On the 19th March the plant had assumed a peculiar club-shaped appearanee, twenty-one inches high, and fifteen inches in circumference at top.

About the 22nd March the sheaths began to unfold themselves and expose the dense clusters of flowers, and at this stage the daily growths became most conspicuous, growing for about eight days at the rate of four inches per twenty-four hours. On the 7th of April the plant stood five feet seven inches high, and the branches thirty-six inches in diameter of spread.

Dr. Balfour thinks the peculiar summer of 1857 may have had some effect in maturing the plant. There is, I find, a similar plant to this one growing in the Dublin Botanic Garden.

Dr. Christison, in his Materia Medica, thus describes the plant supposed to produce true asafœtida: "It has a long root, black without, sometimes deeply divided like the outspread hand, but internally white, fleshy, full of juice, and of an overpowering odour, somewhat like that of garlic. The root, when about a year old, attains the thickness of the thumb, and continues afterwards to increase, till it shoots up a flowering stem, so that it sometimes equals at last a man's calf or even his thigh in thickness. It pushes out annually several large root leaves, which resemble those of the peony, and exhale a strong garlicky odour, like that of the root, but weaker. Rarely in its first year, generally, indeed, not till it is many years old, it produces a flowering stem, which is between six and nine feet tall, about two inches in diameter, and naked, except that it bears rudimentary leaves in the form of the cylindrical bases of leaf stalks. The whole plant dies after it has once flowered and ripened its seeds."

This description tallies in a remarkable manner with the Edinburgh accounts. The large fine flowering plant was cut down by intense frost on the 13th of April last year, and it was a matter of regret. It is thought very probable that the fern-shaped leaves, which are drawn in some figures in botanical works for asafœtida plants, but which appear very different from pictures of narthex, may be the continuation of the small leaf we see appearing out of the sheaths, which, in its own climate, is more developed.

Narthex Asafœtida.
From the plant which flowered in the Edinburgh Botanical Garden, April, 1858.

There is no doubt that some of the ferulas have most pungent exudations, but as far as can be traced, none are equal in pungency and fetidity to the asafœtida plant: the leaves of the *ferula Persica* have hardly any smell of asafœtida, whereas the leaves of narthex have it powerfully. Unfortunately its history is involved in some obscurity, owing to its being confounded with the product of another plant. The word asafœtida is supposed to be derived either from a corruption of an ancient word, *Lasár*, meaning gum, contracted into *Asá* and *fœtidus*, the Latin meaning fetid—or from a Persian word *Assa*, meaning staff or cane; the ancients had an odoriferous as well as a fetid *lasár:* the latter seems the more probable derivation, however, as *assa* appears to be synonymous with *ferula* and *νάρθηξ*. The first direct mention of it seems to have been made by Nicolaus Myrepsus, one of the last Greek physicians who flourished 1227 A.D.; he speaks of *ʿασαφιτιδα*. There is, however, strong reason for believing that it was known to the Greek and Roman physicians.

In order to procure it, the fleshy parsnip-like stalk of the plant is punctured freely or sliced near the ground, when the gum-resin exudes upwards, and is collected from time to time. Sometimes it exudes in limited quantity of its own accord. It appears as a milky white substance at first, which soon assumes, from the powerful chemical actions of air and light, a violet or peach coloured tint, increasing sometimes to a dark red; in this state it is tough and yielding.

According to Kæmpfer, who is perhaps the greatest authority we have on this point, "the asafœtida plant is said to arrive at as great age as man himself, and in consequence its roots sometimes attain a considerable size; it is from wounds in this part that the drug is obtained. The roots are not wounded before they are four years old; the greater their age, the better the quality of their produce."

When he visited its native country there were four operations each year, "the first in the middle of April, the second at the end of May, the third ten days later, and the fourth in the beginning of July. The gatherers on the first occasion only cleared the hard sandy or stony soil away from the root to the depth of a span or so, pulling off the leaves, replacing the earth about the roots, and then heaping the leaves on them, pressing them down with a stone. On the subsequent occasions they slice the root transversely, beginning a little below the top, and collecting the

juice that flows from the wounds. After every operation they cover the root with the old leaves to screen it from the sun. After the last gathering the screens are thrown away, and the roots are left to perish."

In Persia the plant grows wild; in India, however, it is cultivated; in the former country the whole plant is eaten in common with other vegetables, as the leaves are boiled and eaten as greens, while the young root is roasted and eaten before it is of age to yield good gum. In India its use is somewhat more limited, the fruit is imported from Persia and Affghanistan, under the name of *Anjoodan*, being extensively used by the native physicians, while the gum is largely used as a seasoning agent. In this country the gum only is used, and that strictly for medicinal purposes, yet, in France, its use is, in a measure, extended to the cuisine, and it appears that the nearer we approach its native soil through Europe, the more widened seems to be the range of its application. Nearly all the gum comes to this country by way of Bombay, from Herat in Korassen. We receive it in three forms, two of which, however, are comparatively rare.

a. Asafœtida in granis seu lachrymis (Asafœtida in tears, a rare form).

β. Asafœtida in massis, *Lump Asafœtida*, the ordinary commercial form.

γ. Asafœtida petræa, or stony asafœtida, a very rare import.

Scarcely more than eighty hundred-weights of all sorts come annually to this country.

The different varieties of the drug were illustrated by specimens which had been procured for the author in Bombay, by his brother, Mr. Henry Duckworth.

Having described the several methods of administering asafœtida which have been adopted in pharmacy, reference was made to the proximate constituents of the drug, and especially to the essential oil. This oil was described as the most important constituent of asafœtida—that which gives to it its peculiar smell, and principal medicinal properties. Its relationship to the oils of onion, garlic, mustard, and horseradish, was shown. The author then proceeded :—

I would next touch upon this subject in reference to its economical and therapeutical characters. First, *economically*. We have found that it has been known to man from a very early period, and from what has been already considered, we cannot be much surprised to learn that it is extensively used as a condiment, when we see that the active principle in it is co-essential with that of mustard, the horseradish, onion, and garlic, which are all well-known and highly-approved seasonings. The following extract from the "Chemistry of Common Life" may be appropriate here :—"It is a singular coincidence that, without any knowledge of their close chemical relations, among the plants in question different races of men in different parts of the world have long selected and largely used them as condiments to their food. The Englishman to a certain extent relishes his onion, and the Frenchman mildly flavours his more savoury dishes with a touch of garlic or chalot ; but in Portugal and Spain, the onion and the garlic are the relishes of common and every-day life. This taste the Peninsula has probably acquired from Northern Africa. Over the whole of the latter region, from the shores of the Mediterranean to the sources of the Nile, garlic and the onion were most esteemed seasoners of the universal food. Arab, Moorish, and Ethiopian tribes equally delight in them, and this taste is of very remote origin.* The Israelites during their sojourn in the wilderness murmured, saying, 'We remember the cucumbers, and the melons, the leeks, the onions, and the garlic.' (Numb. xi. 5.) Among the ancient Egyptians themselves, the onion formed an object of worship, and the modern Egyptians assign it a place in their paradise. To the present day the onion of the Nile borders possesses a peculiar excellence and flavour. The Eastern Asiatics appear to require more powerful condiments : with them the asafœtida takes the place both of the milder onion and of the stronger garlic." The following observations of the late Dr. Pereira also bear upon this point in an interesting manner. He says: "The relish for flavouring or seasoning ingredients manifested in a greater or less degree, by almost every person, would lead us to suppose that these substances serve some useful purpose in the animal economy, beyond that of merely gratifying the palate. At present, however, we have no evidence to prove that they do ; they stimulate,

(* *Herodotus II.*, ch. 125, tells us that on the pyramid of Cheops there was an inscription recording the quantity of *radishes*, *onions*, and *garlic* consumed by the labourers who constructed it.—D. D.)

but they do not seem to nourish. The volatile oil which they contain is absorbed, but it is subsequently thrown out of the system, still possesing its characteristic odour. A portion of it may, perhaps, be burnt in the lungs, and in this way produce heat."

It may, however, throw some light upon the subject, when we consider another potent property known to chemists with regard to the sulphuretted oils, viz., that they exercise a considerable power in checking certain fermentations.

When we consider this property of the sulphuretted oils, and bear in mind the close relationship of principles in them all, may we not imagine that men have been led instinctively to discover and partake of these substances, as counteragents to the many fermentive actions incident to the human digestive organs, under various circumstances ?

The therapeutical effects of asafœtida were referred to, and the addition of a few drops of chloric ether was recommended as the best means of disguising the nauseous flavour of the drug when administered medicinally.

Royal Institution.

The Seventh Meeting of the Session was held in the Royal Institution, Feb. 3rd,

MR. H. S. EVANS IN THE CHAIR.

Mr. J. W. Nicholson was elected a Member.

The Secretary announced donations from Dr. Nevins and Mr. W. Wright.

Dr. Nevins then delivered the lecture of the evening, on " The Internal Administration of Medicine in a State of Vapour."

A vote of thanks to Dr. Nevins was proposed and carried with acclamation, and the meeting broke up.

Royal Institution.

The Eighth Meeting of the Session was held on Thursday, the 17th February.

The Meeting was chiefly devoted to the consideration of the Bill introduced into Parliament by Mr. Walpole for regulating the sale of poisons. The chair was occupied by Mr. H. S. Evans, the president ; and there was a numerous attendance. After the acknowledgment of several donations by the Secretary,

The President read the Bill, and then a letter from Mr. D. Costine, from which we make the following quotation, as it expresses views reiterated by other members at the meeting :—"I consider that Mr. Walpole's Bill, 'To regulate the Sale of Poisons,' if passed into law, will as a preventive measure be totally inoperative, and that that portion of it which provides that constables shall walk behind our counters and examine our bottles at their pleasure, is a proposition not only most un-English in its character and insulting to the whole trade, but will be completely useless in as far as it is any guarantee to the public of the correctness of the labelling or their safety from accident thereby ; for what could a policeman be expected to know about the various drugs and poisons that are kept upon our shelves ? Could he distinguish arrowroot from arsenic, or laudanum from tincture of rhubarb ? But even were regular drug inspectors appointed to visit our shops at stated periods, the magnitude of the task they would have to perform would completely defeat the object for which it was intended. It is only here and there they could examine a package or bottle, and the greater part of the stock would escape entirely unheeded. In my humble opinion, the promoters of the bill have taken up the task of reforming our trade on a wrong principle. What is required of a legislative enactment is not that drugs should be sold under the surveillance of the police, but that those who are entrusted with the sale of them should be men of such character and education that accident either from carelessness or ignorance would be morally impossible ; that the sale of drugs should be restricted to those duly licensed for that purpose ; and that the vigilance of the police should be exercised, not over those who are properly qualified, but over unqualified persons who vend poisons to the danger of the public and the detriment of the regular dealers. Ours is perhaps the most important trade in the kingdom, and closely allied to, if not a branch of, one of the learned professions. Why, then, should the legislature insult and lower us in the public estimation by making us the subject of police regulations ? If, in these days of reform, legislative enactments are to be forced upon us, let us at least see that

they will be such as will tend to raise our level, and make us in reality worthy of public confidence, by establishing a body of competent druggists throughout the country." In conclusion, Mr. Costine suggested a legal registry of licensed druggists, registration to be attained by examination, instituted by local boards, under the control of a central one, by which terms, &c., should be regulated ; the sale of drugs by persons not so licensed to be visited with penalty, on information.

Dr. EDWARDS, as a member of the Pharmaceutical Society, said that Society considered the bill had no merit in it whatever for the purposes contemplated, inasmuch as its requirements left out of consideration the question of qualification. Those requirements afforded no security to the public, and therefore the measure would be waste legislation. The society had drawn up and agreed to a simple registration bill, which proposed to register for life all at present in the business, and to provide, in addition to chemists, a class of registered dealers not coming up to the chemists' standard of qualification. It would be an injury to the cause of pharmacy to have all admitted at a lower standard than the present. The lower standard would be one that all fit persons would have no difficulty in passing. The Society's bill proposed the simple registration of a sale of poison without the presence of witnesses or the signature of the purchaser, all which would be impracticable in such sales as those of small quantities of oxalic acid to straw-bonnet makers and shoemakers, and of laudanum for minor purposes ; and it also diminished the number of subjects named in the schedule. It seemed the Government preferred to pass a regulative measure, and deal with education afterwards; but the Society thought the two might be considered together, and were ready to give every assistance in making this an efficient and at the same time a reasonable bill.

Mr. ABRAHAM pointed out the difference between the present and preceding Government measures, which showed the anxiety of the Government to produce a bill with as few objections as possible, although they had not quite succeeded ; yet with modifications the present bill might be made less objectionable. The signature of the purchaser could not be taken in executing an order from a customer in the country ; a register of the sale would be sufficient. [A Voice: On a written order.] Whilst poisons ought not to be delivered to very young persons, to restrict their sale to persons above twenty-one would be unnecessarily extreme. The constable provision was manifestly useless, and the penalty (£100) very harsh. Although Government could not enforce the labelling of all bottles containing poison, the chemists themselves could. He should have been glad if the sale of poisons could have been restricted to educated persons, and he thought it would ultimately come to that.

Dr. EDWARDS remarked that an interval between the first and second reading of the bill had been allowed specially for the sending in of objections and offers of evidence ; and the bill would pass unless active steps were taken. It was their duty to memorialise, and, if necessary, appoint a deputation. The bill seemed to involve an attempt to put down laudanum drinking by a sort of Maine liquor law ; but if they closed the door of the chemist and druggist they would open that of the grog-shop and put opium amongst the liquors sold by the publican. It was impossible, he believed, to escape that dilemma in districts where laudanum was sold to be used as a stimulant, and it was in immense use.

A MEMBER remarked that the effect of registration would be to lessen trouble by increasing the smallest quantity to be sold at a time ; and that, as they must have supervision, the question was—what kind is it to be?

Another MEMBER said that with respect to oxalic acid the carrying out of the Act was quite impossible, for people were constantly running for small quantities. When the Arsenic Act came into operation he tried to carry it out, but he was laughed at by his customers, who asked if he thought they were going to poison themselves ; and at last he gave it up. There were many who could not afford to lay out 3*d.* or 6*d.* at a time.

The PRESIDENT showed that several cases of fatal poisoning could not have been prevented by the operation of this bill, and said that nine-tenths of misapplied poisons were obtained from hucksters who combined half a dozen trades. The best protection for the public was to be found in the education and responsibility of chemists; and the Government measure was prejudicial to public interests so far as it relieved them from personal anxiety and responsibility.

Mr. ABRAHAM pointed out that the agitation of which this bill was the fruit originated in criminal poisoning cases, and the prevention of accidents was quite an afterthought, although it was the object with which the bill was professedly introduced.

Mr. D. Mackinlay moved, and Mr. Abraham seconded—

"That the council of the Association be instructed to represent to the Government that certain modifications in the present bill would, in their opinion, render it the least objectionable yet proposed; but that they consider that the thorough education of drug vendors is the only protection against accidents from poisons."

On being put, the resolution was carried ; but four hands were held up against it.

The dissentients, not having taken part in the discussion, were appealed to as to the grounds of their opposition; and Mr. Dutton, of Birkenhead, said he did not see that there was such a call from the public that a bill of that kind should be passed.

A lecture on "Aluminium and its Compounds, especially in reference to Clay," by Dr. Edwards, was postponed, owing to the prolonged discussion on the Sale of Poisons Bill, of which we have given but an outline ; but Dr. Edwards exhibited specimens of the metal, and articles made from it, lent by Mr. Mayer and Mr. Clark, of Church Street. These included a spoon, a fork, a box, bracelets, and studs, all remarkably light. Amongst the properties of the metal is its freedom from the attacks of sulphur and oxygen. Where a silver spoon would be tarnished by the action of the atmosphere the new metal would be unaffected. But it was such a conductor of heat that there was no melting an edge without melting the whole, so that it was impracticable to solder it, and all joints had to be riveted. It fused at a heat a little less than silver, but considerably above that of zinc. It was about twice the price of silver, although so much lighter.

The members separated at half-past ten o'clock.

ORIGINAL AND EXTRACTED ARTICLES.

REPORT OF THE
RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION,
AND OF THE
APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

Occurrence of Sugar in healthy Urine.*—It has generally been considered that healthy urine does not contain sugar, because it does not ferment when mixed with yeast, nor rotate the plane of polarization, nor produce a yellow or red precipitate when subjected to Trommer's test.

The latter test alone is capable of indicating the presence of very minute quantities of sugar, so that the inference that healthy urine does not contain sugar, is based upon the negative evidence of that test. There are, however, other means of detecting sugar in urine. Thus, for instance, since a solution of grape-sugar becomes brown when warmed with potash, Heller has suggested this mode of testing urine. Applying this test to healthy urine, there is, however, scarcely an instance in which a brown colour is not produced to some extent.

The best way of making this experiment is to half fill two test tubes of the same size with urine and caustic potash, then to mix the liquids by pouring them from one tube to the other, and lastly, warming the one half of the mixture until it nearly begins to boil, when its colour will always be found to be somewhat darker than that of the other portion of liquid that has not been warmed. The darkening in the case of healthy urine is certainly not like that which presents itself when diabetic urine is submitted to this test, but it is always sensible and often considerable.

The test recently recommended by Professor Böttger, consisting in boiling the urine with basic nitrate of bismuth and potash, almost invariably gives some indication of sugar with healthy urine.

The black precipitate thus produced does not originate from sulphur compounds in the urine, for when the urine is boiled with alkali and some red lead or litharge instead of the bismuth salt, there is not any darkening unless the urine contain albumen. Consequently, the blacking of the bismuth salt is due to its reduction, and not to the production of sulphide.

But if reduction takes place in this case, it may be asked how it happens that

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* Prof. E. Brücke—*Sitzungsber. der Akad. der Wissensch. zu Wien.*, xxviii., 568.

healthy urine does not reduce oxide of copper when Trommer's test is applied to it. But there is, in fact, such a reduction, though no red precipitate is thrown down.

This is shown by the following experiment. When healthy urine is mixed with potash, and a dilute solution of sulphate of copper added until the liquid becomes distinctly blue or bluish-green, and then warmed, it will be found that the colour changes to a yellow or brown. Then by pouring the half of the liquid into a shallow dish, and stirring it so as to bring it into contact with the air, it gradually becomes more and more green. To determine the extent of alteration in the colour, the liquid may be poured back into the test tube and compared with the remaining half. The explanation of this change of colour, is simply that the blue colour of the protosalt of copper produced by the oxidation of the suboxide salt, gives a green colour with the yellow of the urine which has been darkened by the action of potash.

As regards the absence of a precipitate of suboxide of copper, it will be found that when urine is warmed with potash, ammonia is disengaged, and it is very probable that the ammonia thus set free retains the suboxide of copper in solution. When a dilute solution of caustic potash is mixed with some sugar, ammonia added, and enough sulphate of copper to render the liquid blue, it will become quite colourless when heated, without any deposition of suboxide, and when exposed to the air will again become blue.

This fact is sufficient to show that the negative result of Trommer's test, so far, at least, as the absence of a precipitate is concerned, does not justify the inference that urine does not contain sugar.

Even when there is a precipitate of suboxide, the other constituents of urine may considerably influence the appearance of the reaction.

It often happens that urine to which Trommer's test is applied becomes more or less turbid, but gives neither a red precipitate of suboxide nor a yellow precipitate of hydrated suboxide. The liquid is merely turbid, and presents sometimes a greenish-grey or ochrey colour, and while the surface appears greenish, the liquid has a yellow colour by transmitted light. This reaction does not correspond with that of normal urine or of sugar, it is generally referred to as being a questionable result of Trommer's test.

There still remained the further question, whether the reducing substance in normal urine was sugar.

The darker coloration that the urine acquires by boiling with potash, cannot by itself be taken as a sufficient proof of the presence of sugar. On the other hand, it must be admitted that the presence of small quantities of sugar in the urine is by no means improbable, for we are acquainted with two sources from which it may possibly be derived. In the first place, it may originate ready formed, from the blood, and in the second place, it may originate from the gradual decomposition of the substance which gives rise to the production of indigo, and was observed by Schunk. There are, indeed, many recorded statements as to the presence of sugar in urine that was not diabetic, but these instances have still remained questionable, because the evidence brought forward for or against them was not altogether trustworthy.

In the controversy between Blot and Leconte as to the presence of sugar in the urine of pregnant women, it was urged by the latter observer, that he never succeeded in establishing alcoholic fermentation of the urine, that the reduction of copper salts was due to other substances than sugar, especially uric acid. But though Berlin showed that uric acid does reduce oxide of copper when boiled with it in the presence of alkalies, Leconte's experiments were not more conclusive as to the absence of sugar than Blot's were as to its presence in urine..

Uric acid does not, however, reduce basic nitrate of bismuth, and does not become brown with potash, though this is the case with the urine of pregnant women. Professor Brücke has therefore made a number of experiments for the purpose of testing the method by which Leconte obtained the results on which he based his opinion that the urine of pregnant women did not contain sugar. This method consisted essentially in applying Trommer's test to a concentrated alcoholic extract of the urine. Professor Brücke used for this purpose healthy urine mixed with so much diabetic urine that it gave on the application of Trommer's test a tolerably copious precipitate of hydrated suboxide of copper, which did not readily deposit. By testing the alcoholic extract according to Leconte's directions, no suboxide was separated when the mixture was heated, and it was not till the next day that this took place. Nevertheless, the extract had a powerfully reducing action; it rendered

basic nitrate of bismuth quite black, and discharged the colour of a considerable quantity of a dilute solution of sulphate of copper, but at the same time a strong smell of ammonia was given off, and this substance prevented the separation of suboxide which had been produced. Hence this method of testing does not afford results of such certainty in testing for minute quantities of sugar as had been expected.

In testing by the same method other healthy urine without addition of diabetic urine, it was found, moreover, that in all instances the alcoholic extract reduced basic nitrate of bismuth, and discharged the colour of solutions of copper salts, without, however, giving rise to a deposition of suboxide of copper.

Since making known the results of these experiments, Professor Brücke has made still further progress, in obtaining from healthy urine the compound of sugar and potash.*

He prepared it in the first instance from urine evaporated in a current of air, at the ordinary temperature. The presence of sugar was recognized by the following reactions:—

1. The yellowish solution of the colourless substance in distilled water became of a deep amber colour when boiled with potash, and acquired the smell of molasses.
2. The same solution, boiled with potash and dilute solution of sulphate of copper, deposited red suboxide of copper; and,
3. When boiled with potash and basic nitrate of bismuth, effected the reduction of the salt.

The observations of E. Schunk have shown that urine contains, in various proportions, a substance which, under the influence even of weak acids, is decomposed into sugar and blue indigo, and ultimately red indigo, anthranilic acid, &c. He compares this substance with that existing in the *isatis tinctoria*, which is so readily decomposed that Schunk found it requisite to evaporate the solution under special circumstances, so as to avoid decomposition.

Hence it appeared possible that sugar was produced during the spontaneous evaporation of the urine, and for this reason Professor Brücke endeavoured to prepare the sugar-potash direct from the fresh urine. For this purpose he took the urine of nine healthy individuals, in each of which sugar was recognizable, though the amount was not the same in all instances.

The method adopted was to mix the urine with about four-fifths absolute alcohol, and, when the precipitate had settled, the liquid was filtered, and mixed with just so much alcoholic solution of potash that it had an alkaline reaction on litmus paper. The vessel was then covered and left for twenty-four hours in a cold place. Next day the liquid was carefully poured out, and the beaker turned down on a sheet of filter paper, so that the whole of the liquid might be rapidly absorbed. When the paper did not absorb any more, the beaker was turned up again, and left till it did not smell of alcohol. It was then found that the bottom and sides of the beaker were covered with a crystalline coating. This was dissolved in the least quantity of water necessary for the purpose of applying the above-mentioned three tests.

Professor Brücke has observed that the crystalline coating contains the largest amount of sugar-potash when it presents a tufted appearance, like frost on windows, while the granular or warty crystals that are sometimes obtained contain other substances besides sugar-potash. In one instance he obtained from healthy morning urine a thick granular crust that contained but little sugar.

With regard to the above-mentioned tests, that of Trommer may be applied at once to the liquid, for, on the one hand, the crystalline deposit was never found to contain uric acid, and, on the other hand, substances which yield ammonia were not present. However, it is well not to rest satisfied with the indications obtained with this test alone, because Professor Brücke has found that sometimes the suboxide or hydrated suboxide was not precipitated for a long time. In one instance, only a slight pale bluish-green precipitate was produced on warming the liquid, which did not change by boiling, although the potash test, applied directly afterwards, showed, by the amber yellow colour produced in the liquid, that the urine did contain sugar.

With regard to the bismuth test, Professor Brücke recommends that the boiling should be continued for some time. Much gas is disengaged during the whole time of heating the liquid, even when the temperature is far below the boiling point, or

* *Sitzungsber. der Akad. der Wissensch. zu Wien.*, xxxix., 346.

that at which the reduction of the bismuth salt takes place. This circumstance must not be allowed to mislead the operator.

In applying the potash test there is little to guard against as regards the coloration of the liquid, and in this case the absence of colour in the liquid to which the test is applied renders its indications very delicate. The smell, however, may often be concealed by the presence of adventitious substances, or when the quantity of sugar is very small it may be too feeble to recognize. In such instances Professor Brücke has sometimes found that the addition of nitric acid, as recommended by Heller, was useful; for though the smell is thereby altered, it is nevertheless characteristic and more marked.

A New Method of Preparing Peroxide of Chlorine (ClO_4).—Messrs. Crace Calvert and E. Davis, in a communication to the Chemical Society, have shown that by reacting upon chlorate of potash with oxalic acid in the place of sulphuric acid, this body, which has been hitherto so dangerous to prepare, may be readily obtained with perfect safety; accompanied, however, with carbonic acid. The process which they adopt is as follows :—one equivalent of pure chlorate of potash and nine equivalents of crystallized oxalic acid, well pulverized and intimately mixed are heated in a water bath to about 158° Fah., when the gas, mixed with carbonic acid is steadily evolved. If the temperature is raised, the gas is decomposed, and a mixture of chlorine and oxygen obtained. The addition of water to the materials diminishes the quantity of gas produced.

They consider that the formation of the ClO_4 is due to the formation of an acid oxalate of potash, the chloric acid thus set free being decomposed by the excess of oxalic acid. When the proportions indicated above are employed $\frac{5}{6}$ths of the chlorine in the chlorate of potash is obtained as ClO_4, the other $\frac{1}{6}$th remaining in the flask as chloride of potassium. The analysis of the gas was effected by passing a stream of sulphurous acid through a saturated aqueous solution, boiling, to expel the excess of SO_2, and then estimating the quantity of sulphuric and hydrochloric acids contained in the liquid. From the weights so obtained the formula of the gas was calculated ; for, if the compound were ClO_4 there would be for each equivalent of chlorine five equivalents sulphurous acid oxidized into sulphuric acid.

On the Air of Towns.—Dr. Angus Smith in an address to the Chemical Society has given the results of a series of researches made upon the air of Manchester with a view of indicating the nature of its impurities and their relative proportions.

The average of two experiments for the determination of the quantity of carbonic acid (by absorption with potash) was 0.07908 per cent. The results, however, appear to vary very considerably, dependent on the weather ; when there is much wind blowing they average from 0.045 to 0.08 per cent.; while, at other times, they range from 0.10 to 0.12.

Taking the annual consumption of coals at two million tons, the number of inhabitants at 400,000, and supposing the area to be 16 square miles, the height of atmosphere affected 300 feet, and this air changed 10 times a day, calculation gives 0.0937 as the per centage of carbonic acid ; while, if the average speed of the air at Liverpool be taken, it would give 0.0692.

The amount of sulphur acids were determined by drawing the air slowly through a solution of acetate of lead, contained in two of Liebig's potash bulbs. An experiment lasted generally two months. Two experiments made during dry weather gave respectively 1 grain of SO_3 HO, and 1.076 in 2000 cubic feet. Another experiment made while the weather was moist gave a per centage of 0.0042.

No sulphurous acid was obtained.

From the examination of smoke issuing from chimneys it appeared probable that a portion of the sulphur contained in coal is given off in some other form than that of sulphurous or sulphuric acid, which it is suggested may be caused by the imperfect combustion of the carbon. All attempts to detect ozone within the town failed.

The rain falling within the town constantly presents an acid reaction, and Dr. Smith has given a number of determinations of the amount of acidity and general impurity present.

Dr. Smith has described a new method of determining carbonic acid, and also organic matter based upon the respective actions of manganate and permanganate of potash. Whenever a solution of the green manganate is brought into contact with carbonic acid, either gaseous or in solution, its colour is at once changed to red

The extra equivalent of carbonic acid contained in the bicarbonates of the alkalies is also capable of producing the effect. When the manganate of potash is dissolved in water, enough being added to give a bluish purple tinge, the solution may be kept in well stoppered bottles without apparent change, for at least many weeks; but, if frequently used, it will not keep so long without change. The greatest care must be taken when working with it that no breath should blow on it, and that no foul air of any kind should approach it. If it is to be transferred to another vessel, that vessel must previously be rinsed out with a portion of the manganate solution, as any water which can ordinarily be used for washing a bottle will destroy some of the salt.

To prepare the solution of manganate, a standard solution of carbonic acid is made by filling a bottle with hot and well boiled water, and when cool, adding bicarbonate of potash in the proportion of 21.227 grains of the pure crystals to 5500 grains of water. Each grain of this solution would then contain 0.001802 cubic inches of available carbonic acid. A very dilute solution of blue manganate is then made, and it is ascertained how much of the bicarbonate solution is required to redden fifty-grain measures of it. This solution may then be used for determining the quantity of carbonic acid in the air. The experiment is made in a bottle of known capacity, through which the air to be examined is drawn by a suction pump.

This mode of looking for carbonic acid of course makes no allowance for the other acids; these might be ascertained separately and subtracted. The author states that the reaction requires great attention to peculiar shades of colour, and in the hands of persons the most careful, not much accustomed to it, it may not lead to exact results. He therefore suggests that some other highly coloured substance may be found capable of decomposition by carbonic acid, and proposes the rosolates of the alkalies; a greater time, however, is required to effect the change.

For the determination of the organic matter, Dr. Smith employs a dilute solution of permanganate, which is standardized with a solution prepared by rendering two grains of sugar uncrystallizable, by boiling with a few drops of acid and then neutralizing, and dissolving it in 10,000 grains of water. A certain number of grain measures of the permanganate solution are introduced into a bottle of known capacity, and it is ascertained how many times the air under examination must be changed in order to decompose the whole of the solution.

[Both these processes, however, require a much fuller description of the details and manner of conducting the experiments to render them practically useful.]

A number of determinations of the amount of organic matter contained in the air of different parts of Manchester are given, from which the variation appears to be very great, the quantity being in some cases twenty-two times greater than in others. The author has examined the action of different kinds of air upon the blood, and obtained some curious results. He finds that the air of Manchester exerts a much more powerful and peculiar reddening action than air taken from the seaside, which, however, is not easily accounted for by the presence of any particular substance.

ON THE SYNTHESIS OF THE HYDROCARBONS.

BY M. MARCELLIN BERTHELOT.

(*Continued from page* 283.)

Several Experiments upon the Action of the Hydrogenated Bodies upon the Oxides of Carbon, Nitride of Carbon, and Carbide of Iron.—The preceding experiments are the only ones which have given demonstrative results, but they are not the only ones which have been made. In effecting the transformation of the oxygen compounds of carbon into carbides of hydrogen, several attempts were at first made to effect their direct decomposition with nascent hydrogen, and also by the employment of several hydrogenated bodies. In the operation a dull red heat, or very little above, was constantly employed; the decomposition of the carbides of hydrogen by heat, prevented the employment of any higher temperature.

The following reactions were tried:—

1st. Action of oxide of carbon upon soda-lime.

2nd and 3rd. Action of oxide of carbon upon gaseous ammonia in the presence of copper and of sodium.

4th. Action of carbonic acid and of oxide of carbon upon phosphoretted hydrogen, direct and in presence of soda-lime.

5th. Action of a mixture of oxide of carbon and sulphuretted hydrogen upon iron.

7th and 8th. Several experiments performed upon other carbon compounds, such as nitride of carbon and carbide of iron.

Although these various reactions have not furnished any very decisive results, it may be well to briefly describe them, because they cannot be without some degree of interest, as showing the various causes of failure, and the difficulty of uniting hydrogen with carbon.

1st. Action of oxide of carbon upon soda-lime (an intimate mixture of lime and hydrate of soda). These alkalies tend to transform the oxide of carbon into carbonic acid, the change being effected by means of the oxygen of the water united with the soda ; the hydrogen thus set at liberty is intended to react, in the nascent state, upon a portion of the oxide of carbon. The porosity of the soda-lime is favourable to this decomposition. To effect the reaction, a current of dry oxide of carbon was passed through a green glass tube 40 inches, in length, filled with fragments of soda-lime, and heated by charcoal, as for an organic analysis. No trace of carbide, condensable by bromine, was obtained. The gas collected in the operation had the following composition :—

Hydrogen	13.0
Oxide of carbon.....	86.5
Marsh gas	0.5
	100.0

The oxide of carbon may be separated from the gas by agitating it with a solution of protochloride of copper in hydrochloric acid, by which it is absorbed. These results establish the formation of hydrogen in the reaction of oxide of carbon upon soda-lime.* As to the simultaneous production of a trace of marsh gas, the proof of it rests upon numbers so small as to be scarcely distinguishable from errors of experiment.

2nd. Action of oxide of carbon upon ammonia gas in the presence of copper. This experiment was intended to cause an hydrogenated gas to react upon oxide of carbon, under conditions favourable to the decomposition of the first gas. We know that ammonia gas, conducted over strongly heated copper, is resolved into its elements, nitrogen and hydrogen.

A dry mixture of oxide of carbon and ammonia gas was passed through a green glass tube, heated to redness and filled with fragments of copper reduced by hydrogen. No trace of carbide condensable by bromine was obtained ; and the gas collected consisted entirely of oxide of carbon, being entirely absorbed by the hydrochloric acid solution of protochloride of copper, excepting a little bubble of nitrogen. Then under these conditions, oxide of carbon and ammonia, reacting upon one another, form no carbide of hydrogen. The ammonia appears not to have been decomposed, the temperature maintained being too low ; but it could not have been advantageously raised without going away from the conditions necessary to the stability of the carbides of hydrogen, bodies less stable than ammonia.

3rd. Action of oxide of carbon and ammonia gas upon sodium. Sodium, according to a known reaction, displaces the hydrogen of ammonia, forming a particular combination; it also tends, at the same time, either to unite itself to the oxide of carbon, or to deoxidize it. This reaction appears then well suited to present the carbon and hydrogen to each other in the nascent state. The following is the mode in which the experiment was made, which is not without danger :—

Some pieces of sodium were pressed strongly between bibulous paper, to remove any adhering naphtha, the surface was scraped, to remove more accurately the organic liquid, and the metal fashioned into little ingots, which were introduced into small boats of copper. A certain number of these boats were then placed in a long tube of green glass, through which was passed a dry mixture of ammonia and oxide of carbon. Heat was carefully applied, and the two gases were almost entirely absorbed by the sodium. A portion, however, passed over, which was washed by passing through two flasks, containing sulphuric acid, diluted with its own volume of water, a vessel containing bromine, and a flask of soda, and then collected over the pneumatic trough. The experiment was obliged to be stopped at the end of a quarter of an hour, and

* MM. Pelouze and Millon have already observed this formation of hydrogen in the reaction of hydrate of baryta upon oxide of carbon.

could not be recommenced, in consequence of an accident, to which it may be useful to direct the attention of chemists : a small quantity of melted sodium had got into the conducting tube, which followed the green glass tube; this metal preserved about its ordinary appearance, nevertheless the attempt to remove it, by means of a copper wire, determined the explosion of the metal, and the tube in which it was contained. It is probable that the nitrogen (nitride?) and the oxide of carbon, absorbed by the sodium, themselves communicated the detonating property. Notwithstanding this accident, sufficient gas was obtained for analysis. The following was its composition :—

Oxide of carbon	35
Hydrogen	35
Nitrogen	25
Oxygen	5
	100

The oxygen and all, or part of the nitrogen, came from the air in the apparatus. The hydrogen resulted from the decomposition of the ammonia. No marsh gas was produced. To control the analysis, a portion of the gas was treated with pyrogallate of potash, to absorb the oxygen, then with the chloride of copper solution, to remove the oxide of carbon, and the remainder washed, and exploded in the eudiometer, gave no trace of carbonic acid, and the numbers confirmed the preceding. The bromine contained in the washing flask, dissolved without residue in a dilute solution of soda. Thus the simultaneous action of oxide of carbon, gaseous ammonia, and sodium, under the preceding conditions, produced no carbide of hydrogen. Moreover, the employment of sodium and of potassium, prepared by the usual method, introduce many suspicious points in experiments for the synthesis of the organic compounds; for several things show, that prepared by means of charcoal, these metals retain a certain quantity of carbon in their composition ; they are also preserved in an organic liquid, naphtha, with which they become impregnated, and which we are never sure of completely separating.

4th. Action of carbonic acid upon phosphoretted hydrogen. Phosphoretted hydrogen contains two combustible elements, both capable of acting upon the oxygen of carbonic acid, from which may result nascent carbon, ready to unite with a portion of the hydrogen. These two gases, dried, were made to traverse a green glass tube, heated over a fire. The phosphoretted hydrogen passed almost without alteration, and was destroyed in an eprouvette of bromine, which followed the tube. Notwithstanding, there was formed a trace, almost inappreciable, of a liquid bromide, insoluble in potash. Before collecting, the gas was rapidly passed through a washing bottle containing soda. Analysis gave the following composition:—

Hydrogen	85
Oxide of carbon	1
Marsh gas	1
Carbonic acid	8
Oxygen	1
Nitrogen	4
	100

This experiment appears then to indicate the formation of small quantities of carbides of hydrogen, both absorbable and non-absorbable by the bromine, but their production is so small that it cannot be considered as absolutely demonstrated.

In the hope of arriving at more conclusive results, the experiment was repeated by passing the gases through a tube of porcelain, strongly heated, in order to decompose more completely the phosphoretted hydrogen. At the end of the experiment the porcelain tube contained no carbon, and the bromine dissolved without residue in solution of soda. The gas collected contained 1.5 per cent. of marsh gas, and 53.5 of oxide of carbon. Thus the reaction of phosphoretted hydrogen and carbonic acid at a bright red heat formed oxide of carbon, hydrogen, and marsh gas, but the proportion of the latter was too small to be absolutely demonstrated.

5th. Action of oxide of carbon upon phosphoretted hydrogen in the presence of soda-lime. In the preceding experiment, the two gases were made to react upon each other directly, without the intervention of a third substance. Carbonic acid was chosen in preference to carbonic oxide, as being a body containing more oxygen, and consequently more apt to be decomposed by the phosphoretted hydrogen ; a circumstance favourable to the formation of secondary combinations. In consequence

of the doubtful success of that experiment, oxide of carbon was made to react upon phosphoretted hydrogen in the presence of a substance capable of decomposing the two gases, namely, soda-lime. This substance acts by its alkalinity, it tends to convert the carbonic oxide into carbonic acid, at the expense of the water combined with the soda, hydrogen thus resulting ; it also tends to decompose the phosphoretted hydrogen with production of phosphates and phosphides, from which again results hydrogen: this body, in the nascent state, may then unite with a portion of the carbon of the carbonic oxide. No carbide condensable by bromine was obtained. The gases collected at the commencement and at the end of the experiment had respectively the following composition :—

	Commencement.	Conclusion.
Hydrogen	74	87.0
Oxide of carbon	16	11.5
Marsh gas	1	1.5
Nitrogen	9	
	100	100.0

Then the reaction of oxide of carbon upon phosphoretted hydrogen in the presence of soda-lime produces hydrogen, oxide of carbon, and a little marsh gas. Although the proportion of the last gas is very small, its existence in this experiment appears, if not completely established, at least very probable.

6th. Action of a mixture of oxide of carbon and sulphuretted hydrogen upon iron. Iron easily decomposes sulphuretted hydrogen, by fixing the sulphur and liberating the hydrogen ; it equally tends to deoxidize the oxide of carbon and set the carbon free. We might hope then to unite in this manner the carbon and the hydrogen in the nascent state. No carbide condensable by bromine was obtained. The gas collected consisted of

Hydrogen	37
Oxide of carbon	59
Marsh gas	1
Nitrogen	3
	100

According to the several preceding experiments, the direct reduction of the oxide of carbon by the hydrogenated gases, does not appear to be decidedly effected at a temperature inferior to the melting point of glass. The proportion of carburetted hydrogen found under these circumstances being very small, they might be attributed to errors of experiment, or to impurities in the substances employed. These objections, however, are improbable, because of the gaseous nature of the compounds employed, and the precautions taken to assure their purity. To demonstrate the formation of the carbides of hydrogen, however, we must recur to the more decisive methods described in the commencement of this paper. Two other experiments only will be mentioned, which were tried for the same object : the reciprocal action of hydrogen and cyanogen (the nitride of carbon), and the solution in acids of cast iron. The first had for its special object the formation of bicarbides of hydrogen, but it was not realized.

8th. Dissolving cast iron in acids. We know that cast iron contains a notable proportion of carbon, it is a species of badly defined carbide of iron. In dissolving it in acids, a part of the carbon is separated, but a portion escapes with the hydrogen in the form of gaseous or volatile products. In spite of the efforts of a great number of chemists these products are very little known. Besides the hydrogen, which constitutes the great mass, they contain traces of carbon, of sulphur, and of phosphorus. The present experiments were intended to ascertain if this gas contained carbides of hydrogen absorbable by bromine, such as olefiant gas ; and if it contained any sensible proportion of protocarbide of hydrogen. A current of the hydrogen, obtained from the cast iron and washed in an alkaline solution, was passed through 300 grammes of bromine, contained in two ovoid eprouvettes. The cast iron was acted on by dilute sulphuric acid,* and the experiment continued until the bromine had disappeared, and been vaporized in the current of gas. At the bottom of the eprouvette was found several milligrammes of a crystalline substance, insoluble in water and in potash,

* It is well to remember that the iron filings of commerce contain oil and several organic substances, which interdict their employment in these experiments.

soluble in ether, and crystallizing out again on the spontaneous evaporation of the solution. This substance presented the properties of bromide of carbon ($C_4 Br_4$). Did this result from the action of the gas upon the bromine, or did it pre-exist in the bromine? Its pre-existence is very unlikely, because 300 grammes of the same bromine dissolved in potash without furnishing any analogous product, either directly or by agitation with ether; 300 grammes also completely evaporated in a current of hydrogen obtained by zinc, without furnishing any similar substance. Whatever it may be, the proportion of this substance is too small for its nature and origin to be regarded as established with certainty. This serves to indicate that the gas from the cast iron does not contain an appreciable quantity of bicarbide of hydrogen, neither does it contain any quantity of protocarbide of hydrogen, for the hydrogen obtained in the experiment when exploded in the eudiometer did not furnish half a per cent. of carbonic acid. Equally negative results are obtained by treating the cast iron with hydrochloric acid; and the same with iron carburetted and sulphuretted simultaneously by its action on the sulphide of carbon.

SECOND PART.—*Transformation of Sulphide of Carbon into Carbides of Hydrogen.*

The experiments described in the first part establish the formation of the carbides of hydrogen by means of the simple bodies of which they are composed. This result is so important that it appears desirable to demonstrate it again by other methods, independent of the first and more direct, if not more decisive. Sulphide of carbon is taken as the new starting-point. This body is well suited to the formation of the carbides of hydrogen, on account of the facility with which it gives up in reactions the sulphur which it contains. Nascent carbon thus results in a condition very apt to unite itself with nascent hydrogen. The employment of sulphides of carbon in experiments of synthesis furnishes conclusive results, because it is a very simple body, well defined, analogous in its composition to carbonic acid, and similarly capable of being formed by means of the two elements of which it is composed. It might, however, be objected that sulphide of carbon, to this day, has only been prepared by one process; the reaction of sulphur, not on pure carbon, but upon charcoal, that is to say, upon a complex substance, having a particular structure, due to its organic origin, and influencing in an unknown manner these reactions. In this point of view the results obtained with sulphide of carbon do not possess the same degree of certainty as those obtained with oxide of carbon. In spite of this objection, the value of experiments of synthesis performed with sulphide of carbon cannot be much diminished if we reflect on the simple composition and well-defined characters of this body. But it is essential to operate with the substance perfectly pure and free from all traces of foreign matter. After having distilled at a fixed temperature sufficient of the sulphide for all the experiments intended to be performed, its purity was tested as follows:—

1st. The liquid was distilled and its boiling point verified, then the first few drops which passed over, and the last portions remaining in the retort at the end of the distillation, were separately analyzed: the first contained 84.3, and the latter 84.0 per cent. of sulphur. These numbers agree with the theoretical formula CS_2, which gives 84.2 per cent. of sulphur.

2nd. Several grammes of the sulphide of carbon were heated successively to redness at 400° and at 300° C. in very strong tubes, exhausted of air and sealed in the lamp, with the sulphurable metals, such as lead, copper, tin, iron, zinc, and mercury. These metals should be employed perfectly dry and free from oxide, to prevent the disturbing action of the water and oxygen. Sometimes the action of the metal completely destroys the sulphide of carbon—this cannot be effected with lead, copper, and tin; at other times the decomposition is incomplete and fractional—this takes place readily with the six metals named. In the first case the sulphide completely disappeared without furnishing a trace of hydrogen, of gas, or foreign substance.* In the second case, no permanent gas, nor product distinct from the sulphide of carbon, was obtained. Then the sulphide of carbon intended for the experiments presented all the characters of a pure and definite compound. To effect its conversion into carbides of hydrogen, it was submitted to two series of operations. It was made to react upon an hydrogenated gas, intended to attack at once the two elements which it contains; and this reaction was combined with that of a metal, intended to absorb entirely the sulphur of the sulphide. The gas formed by the first method

* All the samples of commercial sulphide of carbon did not resist this test equally well; the greater part, after their destruction by a metal, left a trace of tarry matter, almost imponderable.

remained mixed with the vapour of the sulphide of carbon incompletely decomposed, which introduced a great deal of complication and uncertainty in the analysis, and prevented the condensation in the bromine of the olefiant gas, so as to isolate the other gaseous elements, therefore these results will be only indicated last, and without being considered sufficiently demonstrative. But the gas formed with the intervention of a metal which completely destroyed the sulphide of carbon, did not present these difficulties, and could be submitted directly to analysis, because it contained only hydrogen and the carbides of hydrogen. The olefiant gas could be readily separated by washing with bromine and regenerated from the bromide by the process already described.

Moreover, the action of the metal upon the sulphide of carbon has the advantage of presenting the carbon to the hydrogenated gas, in the nascent state, as just liberated, and in a condition most favourable to combination. This process has yielded marsh gas and olefiant gas ; the study of the olefiant gas has been pursued to the formation of the alcoholic compounds themselves. After having realized the synthesis of olefiant gas and marsh gas, the experiment has been pushed further ; a reaction has been attempted at a red heat, between one of the preceding hydrocarbons, marsh gas, and oxide of carbon, in the hope that, the oxygen and a part of the hydrogen entering into combination to form water, the carbon of the hydride would unite itself to the carbon of the oxide and to the rest of the hydrogen, and form a carbide of hydrogen more complicated in its constitution. This experiment has succeeded, and a certain quantity of propylene has been obtained. To sum up, the carbon of the sulphide of carbon in uniting itself with hydrogen can form the carbides of hydrogen, and serves, like oxide of carbon, as a starting-point for the synthesis of organic compounds.

1. *Synthesis of Marsh Gas and Olefiant Gas.*—The transformation of the sulphide of carbon into carbides of hydrogen was effected by the following process :—

Over copper or iron, heated to a dull red heat, was passed a mixture of sulphide of carbon and sulphuretted hydrogen ; the metal absorbed at the same time the sulphur contained in the hydrogen compound and in the carbon compound ; a portion of hydrogen was set free, another portion united itself with the carbon, and formed marsh gas ($C_2 H_4$), a sensible proportion of olefiant gas (C_4H_4), and a trace of naphthaline ($C_{20} H_8$). The sulphuretted hydrogen may be replaced by phosphoretted hydrogen and also by the vapour of water. The proportion of the olefiant gas can be increased by reacting upon the iron with a mixture of sulphide of carbon, sulphuretted hydrogen, and carbonic oxide. To establish with a greater degree of certainty the existence and identity of the olefiant gas, it has been converted into characteristic alcoholic compounds, that is to say, into sulphovinate of baryta, and into benzoic ether. As to the marsh gas, it has been isolated by the action of solvents, and studied in the pure state.

The following is the detail of the experiment :—

Action of a Mixture of Sulphuretted Hydrogen and Bisulphide of Carbon upon Copper. The sulphuretted hydrogen is disengaged regularly by the action of dilute sulphuric acid upon sulphide of iron prepared by the dry method; it traverses a washing bottle, a tube filled with chloride of calcium, and then a little flask containing bisulphide of carbon slightly heated. This flask can be previously weighed. The mixture of hydrogenated gas and vapour of bisulphide of carbon then enters a horizontal green glass tube (40 inches long), and the largest possible diameter. This tube contains turnings of copper previously heated, and reduced by pure hydrogen in the same tube, which remains filled with hydrogen gas. It is carefully raised to a dull red heat, studiously avoiding burning the corks, and the mixture of sulphide of carbon and sulphuretted hydrogen passed through; the copper blackens and becomes sulphurized little by little. The tube must be maintained at as low a temperature as possible, yet sufficient to arrest completely the sulphur contained in the gas. For greater security in this respect, a second green glass tube (about 10 in. long and $\frac{1}{2}$ in. wide) follows the principal one, also filled with copper turnings, and heated in the same manner. To the extremity of this last tube, from which the gas passes, is adapted,—1st, a small empty flask kept cold ; 2nd, a washing bottle containing a solution of acetate of lead ; 3rd, an egg shaped eprouvette containing 15 or 20 grammes of bromine under a layer of water, intended to condense the olefiant gas ; 4th, a washing bottle, holding a very strong solution of soda ; the gas is then collected over the pneumatic trough. The proper conduct of the experiment requires some practice. When the surface of the copper, contained in the large tube, is found to

be entirely sulphurized close up to the cork, and the copper in the small tube begins to blacken, the flask in which the HS is generated should be immediately detached, and the flask containing the CS_2 weighed ; the loss of weight it has undergone indicates the quantity of CS_2 used in the experiment.

If the current of gas is prolonged a minute more, the bubbles which pass through the acetate of lead give a brown coloration; beyond this time, the vapour of sulphide of carbon passes through the flasks, is condensed in the bromine, and lastly, becomes also mixed with the marsh gas, and disturbs all the results, but it is easy to prevent this accident, if the experiment be stopped at the right moment.

It remains to examine the products formed during the experiment. The copper contained in the tube has retained the sulphur, and a portion of the carbon ; it is converted on the surface into sulphide of copper; dissolved in aqua regia, it furnishes some amorphous carbon without lustre. The little flask which followed the heated tube contained several sparkling crystals of naphthaline, and a trace of empyreumatic oil, having a tarry and fetid odour. On dissolving the bromine in the eprouvette, in solution of soda, a notable proportion of a neutral liquid was obtained, presenting the characters of brown Dutch liquid. [The gas collected over the pneumatic trough was fractioned during the experiment, and the different samples separately submitted to analysis, the particulars of which are described. They contained respectively 16, 10.2, and 20 per cent. of marsh gas, and 84, 30.6, and 70.7 of hydrogen, mixed in some cases with a little air from the apparatus.]

To confirm the results of the analysis, some of the gas was mixed with one and a half times its volume of chlorine, combination was allowed to commence in the dark, then continued in diffused light and terminated in the sun's light irregularly reflected on a wall. Perchloride of carbon was thus obtained, $C_2\ Cl_4$, a liquid chloride corresponding to marsh gas.

2. *Action of a Mixture of Bisulphide of Carbon and Sulphuretted Hydrogen upon Metallic Iron.*—The apparatus, mode of conducting the experiments, and products obtained, were precisely the same as in the former case.

3. *Action of a Mixture of Sulphide of Carbon and Phosphoretted Hydrogen upon Metallic Copper.*—Some phosphide of calcium was contained in a tritubulated flask, which was followed by a wash bottle, a drying tube filled with lime, and the little flask containing the sulphide of carbon ; the rest of the apparatus being the same as in the former case. The whole is filled with pure hydrogen, and water is poured on the phosphide of calcium, when the gas is disengaged and the remainder of the operation, and the products resulting are in every respect the same as in the first case.

4. *Action of a Mixture of Sulphide of Carbon and Vapour of Water upon Iron.*—The vapour of the sulphide of carbon raised to ebullition in a flask, passed through water maintained a little below 212° F. in a retort carried some of the vapour of water with it ; the rest of the apparatus was arranged as before.

The bromine contained a trace of a neutral liquid compound. The gas collected contained 6 per cent. of marsh gas and 92 of hydrogen. The preceding experiments establish the transformation of sulphide of carbon into carbides of hydrogen, that is to say, the production of a carbide of hydrogen analogous to CS_2, through the affinity which exists among these elements.

In fact, in equal volumes of marsh gas $C_2\ H_4$, and the vapour of CS_2, there is found equal weights of carbon, and equivalent weights of hydrogen and sulphur. However, all the carbon of the sulphide, and all the hydrogen of the gas, do not enter into combination ; a portion of the carbon is found fixed upon the copper, and a part of the hydrogen free, mixed with the marsh gas.

This partition of the elements resembles many different processes of simultaneous decomposition, it is presented in almost all the reactions of organic chemistry; in the present case, it attests the feebleness of the affinity which unites the carbon with the hydrogen, and the facility with which these elements, both in the nascent state instead of combining with each other, remain unassociated.

(*To be continued.*)

A NEW LOCAL ANÆSTHETIC.

M. A. Claisse, of St. Valérien, has been in the habit of using a local anæsthetic, which allows him to draw teeth, open abscesses, and perform other minor operations without the patient's feeling the slightest pain ; it is as follows :—Fill a small flask one-third full of powdered camphor, and fill it up with sulphuric ether. With a sponge dipped in this solution, the gum, or the part where the bistoury is to be used, is gently rubbed for about one minute previous to the operation.—*Gazette Medicale.*

LINIMENTUM SAPONIS.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—In the discussion that has taken place on this preparation, so far as I can discover from the reports of it in the Journal, it appears to me that one very important point of the question has been omitted—viz., which kind of soap and what strength of spirit will form the best liniment for all purposes that this very common and useful preparation is required. I think, to discuss the question only on its chemical bearings, and to limit them to two or three compounds is narrowing the basis of the inquiry too much. Of what consequence is it whether tincture of iodine is decolorized by it or not? Such a combination will in no way be rendered less efficacious by such a change. The preparation is a liniment not an embrocation, and I have a very strong impression that proof spirit and sapo mollis will be found to fulfil this condition better than rectified spirit and sapo durus. In the one case you have a fluid that will fulfil the intentions of a liniment admirably, in the other one that will do so only imperfectly. I would suggest that this practical point be decided by a practical experiment, and not allow this matter, which is a very important one, to be decided on false principles. Theoretical perfection is not always practical usefulness.

I am, Sir, yours respectfully,

Bradford, February 4th, 1859. F. M. RIMINGTON.

SALE OF POISONS, &c., BILL.

WHEREAS an Act was passed in the session holden in the fourteenth and fifteenth years of her Majesty, chapter thirteen, "to regulate the Sale of Arsenic," and it is expedient to make provision concerning the keeping of poisons, and to make further provision for regulating the sale and delivery of poisons: Be it enacted by the Queen's most excellent Majesty, by and with the advice and consent of the Lords spiritual and temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:

I. This Act shall commence and take effect from and after the *thirty-first* day of *December, one thousand eight hundred and fifty-nine.*

II. The said Act of the fourteenth and fifteenth years of her Majesty shall be repealed.

III. In the construction of this Act the word "poison" shall mean any drug or substance mentioned or referred to in the schedule (A) to this Act.

IV. Every person keeping for sale by retail any poison, and every Apothecary, Surgeon Apothecary, or other member of the medical profession, and every Chemist or Druggist, and every officer of any hospital, infirmary, or dispensary, having under his custody any poison, shall keep all poisons in boxes, bottles, or vessels, distinctly labelled respectively with the names of the poisons contained therein, and with the word "POISON" in conspicuous capital letters.

V. No person shall sell any poison to any person who is unknown to the person selling the poison, unless the sale be made in the presence of a witness of full age who is known to the person selling the poison, and to whom the purchaser is known; and no person shall sell any poison to any person other than a person of full age.

VI. Every person who sells any poison shall forthwith, and before the delivery of the same, enter or cause to be entered, in a fair and regular manner, in a book or books to be kept for such purpose, in the form set forth in the schedule (B) to this Act or to the like effect, the following particulars of and in relation to such sale: (that is to say), the date of the sale and delivery and the name and quantity of the poison sold, together with the name, surname, place of abode, and condition or occupation of the purchaser, and the purpose for which the poison is required; which particulars, so far as they are not within the knowledge of the seller, he is hereby authorized and required to inquire into of the purchaser, before the delivery of the poison; and in every case before the delivery of the poison such entries shall be signed by the seller and by the purchaser, and (where the sale is required to be made in the presence of a witness) also by the witness, who shall add his place of abode.

VII. No poison shall be sold, either in a solid or liquid state, unless the box, bottle, vessel, wrapper, or cover, as the case may be, in which such poison is delivered, be distinctly labelled with the word "POISON" in conspicuous capital letters, and with the name, surname, and address of the person selling the poison.

VIII. No person shall sell any arsenic unless the same be before the sale thereof mixed with soot or indigo in the proportion of *one ounce* of soot or *half an ounce* of

indigo at the least to one pound of the arsenic, and so in proportion for any greater or less quantity: Provided always, that where such arsenic is stated by the purchaser to be required for some purpose for which such admixture would, according to the representation of the purchaser, render it unfit, such arsenic may be sold without such admixture in a quantity of not less than *ten pounds* at any one time.

IX. The provisions hereinbefore contained concerning the sale and delivery of poison shall not extend to the sale of opium where the quantity sold does not exceed grains of the opium, crude or in powder, or extract, or minims of the tincture or to the sale of any medicine required to be made up or compounded according to the prescription of a legally qualified Medical Practitioner, or made up or compounded by a legally qualified Medical Practitioner or Pharmaceutical Chemist, or by a Veterinary Surgeon having a licence or diploma from the Royal College of Veterinary Surgeons, or from the Royal Highland and Agricultural Society of Scotland, or to the sale of any patent medicine, or to the sale of poison by wholesale to retail dealers upon orders in writing in the ordinary course of wholesale dealing.

X. Provided, nevertheless, That all liquid medicines intended for external use, and consisting of or containing any poison, shall be delivered or sold and delivered (as the case may be), as well by legally qualified Medical Practitioners as by others, in bottles labelled in conspicuous capital letters "POISON" or "FOR EXTERNAL USE."

XI. It shall be lawful for two justices of the peace in England or Ireland, or the sheriff or two justices of the peace in Scotland, to authorize any constable at all seasonable times to enter into any shop or place where poisons are kept for sale by retail, or for compounding (other than the dwelling of a legally qualified Medical Practitioner), for the purpose of ascertaining whether or not all boxes, bottles, and vessels in which poisons are kept are distinctly labelled as required by this Act, and to make search and do all acts necessary for the purpose aforesaid.

XII. If any person who is subject to the provision hereinbefore contained in respect of the keeping of poisons, fail to comply with such provision in respect of any poison kept by him or under his custody;

Or if any person sell any poison, save as authorized by this Act;

Or deliver the same without having made and signed the entries hereby required on such sale, or without having obtained such signatures to such entries as are required by this Act, or without complying with all the provisions of this Act in relation to the sale of such poison;

Or if any person purchasing any poison give false information to the person selling the same in relation to the particulars which such last-mentioned person is hereby authorized to inquire into of such purchaser;

Or if any person sign his name as aforesaid as a witness to a sale of poison to a person unknown to the person so signing as a witness;

Or if any person sell or deliver any liquid medicine intended for external use, and containing any poison, otherwise than in a bottle labelled as aforesaid;

Or if any person refuse to admit any constable authorized to enter as hereinbefore provided into a shop or place which he is so authorized to enter, or shall obstruct or hinder him in the execution of his authority;

Every person so offending shall for every such offence, upon a summary conviction of the same before two justices of the peace in England or Ireland, or before two justices of the peace or the sheriff in Scotland, be liable to a penalty not exceeding *Five Pounds* for the first offence, and to a penalty not exceeding *Twenty Pounds* for the second offence;

And every person so convicted of such offence more than twice shall for the third and for every subsequent offence, upon a summary conviction of the same as aforesaid, be liable to a penalty of not less than *Twenty* nor more than *One Hundred Pounds*.

XIII. If the person selling or delivering any poison, or any liquid medicine intended for external use, and containing poison, without complying with all the provisions of this Act in relation to the sale or delivery thereof, be an apprentice or servant acting on behalf of his master, then the master, on whose behalf the sale or delivery is made, as well as such apprentice or servant, shall be liable to the penalty imposed by this Act in respect of the offence.

Schedules to which the Act refers.

SCHEDULE (A).

Arsenic and its compounds. Corrosive sublimate. The poisonous vegetable alkaloids and their salts. Prussic acid. Cyanides of potassium. Essential oil of bitter almonds, unless deprived of its prussic acid. Cantharides. Aconite and its preparations. Oxalic acid. Nux Vomica. Coculus Indicus. Opium, crude, or in tincture, extract, or powder.

SCHEDULE (B).

Date of Sale and Delivery.	Name and Surname of Purchaser.	Purchaser's Place of Abode and Occupation.	Name and Quantity of Poison sold.	Purpose for which required.
Saturday, Sept. 26, 1860. 10 30 A.M.	*Henry Holmes*	27, *Snow's Fields, Bermondsey, Shoemaker.*	*Arsenic* ½ *lb. Coloured Blue with Indigo.*	*For destroying Rats and Mice.*

(*Signature of Purchaser.*)
HENRY HOLMES.

(*Signature of Witness.*)
JOHN SIMS,
26, Tooley Street,
Southwark.

(*Signature of Seller.*)
SAMUEL EDWARDS.

SALE OF POISONS BILL.

House of Commons, Tuesday, February 8th, 1859.

MR. WALPOLE, in moving for leave to bring in a Bill to regulate the keeping and sale of poisons, said,—I am not aware whether the House wishes me to go into details of the Bill now, or to do so on the second reading, but perhaps I may be permitted to state this:—At the end of last session a Bill for regulating the sale of poisons unanimously passed the other House. When it came down here great objections were taken to it on two grounds—first, that the late period of the session did not allow sufficient time for its consideration; secondly, that the trade of druggists would be interfered with by clauses and restrictions in that Bill. With regard to the late period of the session, that objection is rectified by my bringing forward a Bill at the earliest possible opportunity. With regard to the second objection, I may state that I think I have obviated many difficulties in the way of the Bill of last session. But all the reasons which urged the propriety of such a Bill last summer are increased, I think, to an amazing extent by the fearful occurrence which took place in the autumn at Bradford, and I am sure no one holding the high place which I do would be doing his duty, and Parliament would not be doing their duty, unless they endeavoured by some regulations to prevent those accidents and mistakes in the sale of poison by means of which the whole population is put in peril. The object of the Bill which I venture to propose is entirely to regulate the sale of poisons, and I found my provisions on the provisions in the Arsenic Act and the Act for further Regulating the Sale of Arsenic. The Arsenic Act contained certain provisions for regulating and restricting the sale of arsenic. Where a person wishes to purchase arsenic, the fact of the sale, the names of the parties concerned in the sale and purchase, and other circumstances attending the transaction, must all be registered at the time. The question arises whether those provisions have answered the purpose for which they were intended? According to the evidence of Mr. Bell and other gentlemen representing the Pharmaceutical Society, Dr. Taylor, and other famous chemists, given before a committee of the House of Lords, the Arsenic Act has to a great extent tended to diminish the number of poisonings from arsenic. He should, however, mislead the House if he were to omit to mention that while the cases of poisoning by arsenic had so much decreased in number, deaths from other poisons had become considerably more frequent. The House will observe that of the number of deaths which occur from poison, many arise from accident. As to deaths occasioned by poison, where the poison is given for the purpose of taking away life, or where it is taken by persons themselves with that view, I am well aware that you cannot by any regulations altogether prevent that form of the evil. With regard to murder by poison, there are provisions in my Bill which may assist in detecting the perpetrator; but I do not think it will have any material effect in preventing murder by the administration of poison. If you refer to the Registrar-General's returns, you will find that eight-tenths of the cases of self-destruction are by the halter, drowning, or the knife—and there are only two-tenths which can be referred to poison and other causes. Therefore, it would mislead the House if I held out any hope of being able greatly to diminish the number of suicides by the provisions of this Bill. Its

chief object is to regulate the keeping and sale of poisons, so as to prevent the deaths which occur by accidental poisoning. The other question which I have to submit to the House is, what things should be included in the schedules of the Bill as poisons? In the Bill of the other House there were 23 articles in one schedule, and I don't know how many in the other. It was utterly impossible, with such schedules, that the business of a chemist could be carried on. Nor was there any necessity to include all these articles in them. The case of death by poison arose from a very few articles, and I have therefore cut the number down from 23 to 13 ; and I shall be very glad if any hon. gentleman will point out to me how it can be further reduced. The only article about which I entertain a difficulty is opium, because it is one of those things which are constantly asked for by the poorer class of people in small quantities, and if you put a difficulty in the way of giving it in small quantities to persons who desire it, you may interfere inconveniently with the trade of the chemist. I get over the difficulty by providing that, where any poisonous article is required by a medical prescription, or where opium is asked for in small quantities, the stricter provisions of the Bill shall not apply. The subject is one of considerable difficulty, and I invite the serious attention of the House to it, in the hope of framing such a measure as will meet completely the end we have in view. The right hon. gentleman concluded by moving for leave to introduce the Bill.

The motion was agreed to, and the Bill was subsequently brought in and read a first time.

The second reading was fixed for Monday, Feb. 14th, when it was deferred till Friday, the 18th.

On the order for the second reading,

Mr. D. Griffith said it had scarcely been long enough before the country to afford time for an expression of opinion.

Mr. Kinnaird also urged that further time should be given for its consideration.

Mr. Walpole stated that the clauses which had elicited the great opposition last year had been struck out. He was anxious to put the Committee off to a distant day, in order to give ample opportunity for considering the provisions of the Bill; and he thought it right to state, that, although he had received a number of letters suggesting amendments, there had been no opposition whatever to the principle of the measure. The Bill was then read a second time, and ordered to be committed on Monday, Feb. 28.

POISONOUS PROPERTIES OF HOLLY BERRIES.

A case of poisoning by eating the berries of the common holly has been brought to our notice by a correspondent. The following paragraph has appeared in the *Chelmsford Chronicle*:—

"Death from eating Holly Berries.—A little boy named Fuller, the son of a labouring man at Northiam, died a few days since from the effects of eating the red berries of the holly. His parents appear not to have known the poisonous nature of the berry, and allowed the child to eat about twenty or thirty before it was discovered by a neighbour. Though he was very ill and vomited during the night, medical aid was not called in till the morning, when it was too late to save the child. Mr. Harris, a surgeon, said the berries had produced violent inflammation of the intestines, and caused death. The jury at the inquest returned a verdict of 'Died from inflammation of the stomach caused by eating a vegetable irritant.'"

This lamentable accident will, we trust, draw attention to a source of danger very little suspected. There is not one person in a county who dreams that the berries, whether red or yellow, with which churches and country houses are so copiously decorated from Christmas to Candlemas, are little less dangerous than so many pills of red lead or even arsenic. And it is to be feared that this fatal case in Essex is only one of many which have occurred without the cause being suspected. It is scarcely possible indeed that such tempting berries should have been annually thrown in the way of children without having been eaten—with what consequences is now seen.

It is not a little curious that the berries of the holly-tree should be never named as poisons, even by writers on the subject of vegetable products. Orfila is silent as far as we can discover, in a couple of heavy volumes without an index. Christison says nothing, at least not in the third edition of his book on poisons. Pereira, Geiger, Richard, Wood and Bache, and such other Materia Medica authors as we have at hand, treat the holly as a harmless tree. All that Smith could find to relate

is, that "the Druids are said to have introduced this custom (that of Christmas) for the accommodation of certain sylvan spirits of a chilly constitution while the oaks were leafless!" And yet he might have found something more worthy of science than such anility; for Rembrandt Dodoens had 250 years before announced that holly berries are purgative in doses of 10 or 12.

There are, however, botanical writers who have pointed out the dangerous properties of these berries. De Candolle, in his *Flore Française*, says they are purgative; Achille Richard quotes Dodoens; Endlicher, in his *Enchiridion*, describes them as being violently purgative (*vehementiùs purgant*); and in Lindley's Vegetable Kingdom their character is given still more distinctly: "The berries are purgative and emetic; six or eight will occasion violent vomiting." It would seem, however, that none of these authors had heard of fatal cases. And we believe that so important a fact is now for the first time established by the verdict of a coroner's jury. Let us hope that it will prove a warning, and that the danger of placing holly berries, whether red or yellow, within the reach of children, will never again be forgotten by parents or servants.

Before quitting this subject, we must take the liberty of adding a word or two of censure upon the coroner's jury. These gentlemen were told that the child had died from eating holly berries; that was what the evidence proved; and it was their bounden duty to say so. But they did no such thing. Their verdict was, that the child died from eating a *vegetable irritant*. Some may doubt whether the jury knew the meaning of their own words. At all events, they could not know that a vegetable irritant was the cause of death; they could not know whether it was irritation caused by holly berries, or something else caused by holly berries which had caused death. Mr. Harris, the surgeon, could not have possessed absolute certainty on the subject; more effects may be caused by poisons than men dream of in their philosophy; all that he could say was that he found inflammation, and he found holly berries. It was open to question whether inflammation caused death; there was no question that death was caused by holly berries, and the verdict should have been accordingly.

If jurymen would condescend to use plain English, understood by everybody, especially in a case like this, which was to be a warning to country people, instead of rummaging a dictionary for Latin words which to peasants are incomprehensible, they would not only act a more sensible part, but they would not so word their verdict as to leave it doubtful, after all, whether death was caused by holly berries or something else, as they have done in this case, without intending it.—*Gardeners' Chronicle.*

FATAL EFFECTS OF SULPHUROUS ACID GAS.

Plymouth, January 5th.—The Western Counties Superphosphate Manure Company, at Torpoint, Cornwall, have, for the purposes of their manufactory, a lead tank, 100 feet long by 17 feet wide, and 12 to 13 inches deep, divided into three equal compartments. This tank is enclosed in a chamber lined with lead, about 15 feet high, having three holes of 10 inches diameter in the roof for ventilation, and three manholes in one side. The chamber is lofty, for the purpose of condensing the gas which arises from the sulphuric acid in the tanks, where it is usually deposited to a depth of about 12 inches; at the present time it is about 6 inches. A leak having been discovered in compartment No. 1, six men—Henry Winnicott, Thomas Bellamy, Charles Pomeroy, David King, Edward Collings, and William Fursland—were directed on Monday morning to bale its contents into compartment No. 2. The duty was known to be a severe one, and accordingly they went in two at a time, remaining only about ten minutes or a quarter of an hour. The quantity in No. 1 tank was $5\frac{1}{2}$ inches deep, and it had been reduced to $1\frac{3}{4}$ inches, when the men began to complain, and were ordered by the foreman to desist for the day and resume the work on Tuesday. They were, however, as they said, determined "to make but one job of it." In the afternoon, Winnicott, who is 50 years old, was the first to exhibit great exhaustion, but, although pressed by Mr. Shepherd, the manager, to go into the open air, he obstinately refused, and about an hour after he was carried to the office, where medical aid was administered, and mustard poultices applied, but the difficulty of breathing continued, and at 6 o'clock in the evening he expired on the floor. Thomas Bellamy, 45, died at his house, at 4 o'clock on Tuesday morning. The gas had no immediate effect on Pomeroy, 35, but he became seriously ill subsequently. Edmund Collins, 50, was slightly affected. Fursland, 45, and Pomeroy,

35, although longer at the work than the others, experienced no inconvenience. The tank was cleared out about 12 months since without any ill effects on the men. Winnicott has left a widow and nine children ; he has been many years engaged in the manufacture of manures, and is said to have been taken home twice from his previous employment apparently dead. The inhalation of an over quantity of the gas in the chamber is attended with fatal consequences, because it contains an excess of oxygen—the very reverse of that which causes suffocation. Sulphuric acid gas produces rapid pulsation, an excessive flow of blood through the lungs and heart, and a state of increased activity throughout the entire system.—*Times*, January 6th.

ACCIDENTAL POISONING BY LAUDANUM.

An inquest has been held by Mr. Carter, the coroner, at the Prince Regent Tavern, Beresford Street, Walworth, on the body of the infant daughter of Mr. W. Benwell, whose death occurred under the following circumstances. On the evening of Tuesday, February 8th, a woman who acted as nurse to Mrs. Benwell rushed into the room, and said that she had given the child a spoonful of some embrocation instead of its proper medicine. The child was found in a state of stupor, from which it could not be aroused. Dr. Nott, who had been attending the mother, was sent for, but the deceased never rallied, and died on the following day. The nurse afterwards stated that she made a mistake in the two bottles, which stood side by side on the mantelpiece. The bottle containing the embrocation was long and thin, and was labelled, but the one that contained the medicine was not, and was short and thick. Both of them were white glass, but they were by no means alike in shape. It appeared, from the evidence of Dr. Nott, that the embrocation was composed of camphorated oil and laudanum, one fourth being laudanum. The medicine supplied for the deceased was a very simple one, to comfort the bowels, and he did not think it necessary to label the bottle. In the dose given to deceased there were from fourteen to fifteen drops of laudanum, being more than ample to cause death. The coroner said, if an Act of Parliament were passed compelling chemists or medical men to dispense all poisons or poisonous mixtures in coloured bottles instead of white, such fatal mistakes as the present would be prevented.—The jury returned a verdict to the effect that the deceased was accidentally poisoned.

DEATHS FROM CHLOROFORM.

The French medical journals have announced two deaths from the administration of chloroform during the last fortnight. In both cases the subjects were young and comparatively healthy. No lesions were found which could account for death upon the cardiac hypothesis, or upon any other reasonable theory based upon pathological investigations. In both cases the quantity of chloroform administered was very moderate, in one very small. M. Marjolin has had recourse to a far-fetched, and, we think, a very improbable theory of enfeebled innervation to account for death in his patient. We cannot think it justifiable to form, far less to publish, such an opinion. One fact is common to both histories. The chloroform was administered without the intervention of any apparatus, and therefore without any means being used for regulating the intensity of the dose, or ensuring the proper dilution of the vapour by atmospheric air. Surely, in the face of the numerous deaths which have occurred under these circumstances, surgeons will not persist in rejecting that simplest of all precautions, the employment of an inhaler such as that of Snow, with Sibson's mask, which permits of the exact regulation of the dose, and ensures the dilution of the chloroform with a large quantity of atmospheric air. Chloroform, when diluted to such an extent that it forms only five per cent. of the inspired air, produces anæsthesia safely, gradually, and agreeably; but it cannot be administered thus loosely, "on a handkerchief" or "a simple sponge," without seriously increasing the danger of its inhalation.—*Lancet.*

OBTAINING A DIPLOMA UNDER FALSE PRETENCES.

At a commission of Oyer and Terminer, Dublin, John Edward Protheroe and Dr. Charles Evans Reeves were indicted for an attempt to obtain, under false pretences, a diploma from the King and Queen's College of Physicians in Ireland.

The Solicitor-General (Mr. George, Q.C.) stated that the Crown had agreed that the case should be settled as the counsel for the prisoners had stated. Though a

diploma or degree had been obtained under false pretences, yet it should be remembered that this could be of no possible use to the prisoners, and that it was at present in the hands of the police, by whom it would be restored to the College. Under these circumstances, and although the Crown were ready to prove the case, they thought that, considering the length of time during which Mr. Protheroe and Dr. Reeves had been in custody, and the injury done to their prospects and character by the charge, they had been sufficiently punished, and it was accordingly agreed not to press for severe punishment, but to permit the prisoners, upon pleading guilty, to be discharged, having entered into recognizances to appear for judgment when called on. He thought that the counsel for the defence had shown a wise discretion in advising this plea of "guilty." He hoped such an offence would not again be committed. A new Act had lately come into operation, in which the status of the King and Queen's College of Physicians was recognized, and in which stringent punishments were provided to be inflicted on any party who should cause false registration or obtain a diploma under false pretences. On these grounds, and as the College authorities seemed to believe that the character of the College would be sufficiently respected, and justice vindicated, by the course it was proposed to adopt in this case, he agreed that the prisoners should be discharged from custody.

Baron Richards said that as the Crown had agreed to the arrangement of the case, he would not question the propriety of the course which had been adopted, and he must say that he believed the prisoners had been very well advised. The offence which had been committed he considered to be one of a very serious nature.

Judge Ball hoped that it would be remembered that the responsibility of arranging the case rested with the Crown, and that the Court was not to be considered as any party to the arrangement.—*Lancet*.

PROSECUTION OF A MEDICAL QUACK.

WESTMINSTER COUNTY COURT, FEBRUARY 9.—(Before Mr. BAYLEY.)

Scattergood, v. *John Gibson Bennett*.

THE plaintiff, a young lady, sought to recover £5 5*s*. from the defendant, an alleged notorious medical quack, trading under the following *aliases*:—Dr. Coulston, Dr. Watters, Dr. Woodward, Dr. Luders, Dr. Silvester, Professor Vanbrugen, &c.

The case was important, as the first promoted by the London Medical Registration Association, organized for the purpose of enforcing the requirements of the New Medical Registration Act.

Mr. Bowen May appeared for the plaintiff, and Mr. Haines for the defendant. The plaintiff stated that she applied to the defendant in consequence of an advertisement in the newspapers, to the effect that deafness would be cured in ten minutes; she saw the defendant, who passed as Dr. Coulston, and who stated that he could effect a perfect cure for ten guineas ; but, on the plaintiff informing him that she could not afford that sum, he agreed to effect the cure for five guineas, which would include an apparatus ; however, he gave only a small bottle. as being much safer, the contents of which he directed to be rubbed on the ears at night, this produced great pain, and did no good. The plaintiff went several times, but was never able to see Dr. Coulston, and was at length informed that he had left the country. Considerable amusement was caused in the court by the description, by one of the witnesses, of some pills advertised by the defendant for the cure of nervousness, which were composed of new bread and plums moulded together ; a caution being sent with each box that not more than one pill should be taken in the morning.

The defendant, in examination, denied that he had received the money, or that he had assumed the names as alleged; but his Honour, in reply stated that the evidence of the plaintiff was conclusive, and there could be no doubt of a conspiracy and fraud having been committed, and while giving the plaintiff a verdict for the amount claimed, he would commit the defendant for 40 days. The defendant was then arrested, and the proceedings terminated.

BOOKS RECEIVED.

A MANUAL OF PHOTOGRAPHIC CHEMISTRY, including the Practice of the Collodion Process. By F. FREDERICK HARDWICH, Lecturer on Photography in King's College, London, &c. &c. Fifth Edition. London: John Churchill, New Burlington Street. 1859.

MANUALE PHARMACEUTICUM. Auctore, H. HAGERO. Lesnac. 8vo, pp. 309.

TO CORRESPONDENTS.

INFRINGEMENT OF THE PHARMACY ACT.—Several cases of the illegal use of the title Pharmaceutical Chemist, and imitations of the Arms of the Society, by persons who have not, and some of whom never had, any connexion with it, have lately come under the notice of the Council, and upon an official communication with the parties, informing them of the liabilities incurred, the offence has been discontinued.

MEETINGS on the subject of the Sale of POISONS BILL.—Our space does not admit of a report of all the meetings that have been held on this subject. The meeting at Liverpool, and the Report of the proceedings of the Council at the commencement of this number, will be found to contain in substance all the objections and suggestions which have been stated. At a meeting at Brighton, February 18th, most of the objections of the Council were noticed. It was also the opinion of some that all Chemists and Druggists in business at the date of the Act should enjoy the same exemption as medical men and Pharmaceutical Chemists. Vested rights of course ought to be respected; but any honorary distinction founded on qualification, has reference naturally to persons recognized by law as being qualified.

Mr. Houlton.—We doubt the policy of publishing the letter, the principal argument being liable to misconstruction.

Mr. Smith.—The paper on the substitution of glycerine for spirit in concentrated infusions is questionable, unless as a suggestion to the Pharmacopœia Committee. An infusion consists of the active principles of certain drugs obtained by maceration in water. An exception or two might be pointed out when a portion of spirit is ordered, but the peculiarity of infusions, as a rule, is, that they contain no spirit. The subject is worthy of discussion at a meeting with a view of arriving at uniformity in these preparations.

G. A. (Portsea).—The specimen is clearly not what it is represented.

A would-be A. P. S. (Woolwich) should give his name and address, when the requisite instructions will be forwarded by post.

S. S. L. (Clare).—We have made the mixture, but have not observed the change alluded to.

M. P. S. (Wakefield).—*Syrupus Ferri Biphosphatis.* Biphosphate of Iron, ℈ij., simple syrup f℥viij., ♏.—(*Greenish.*)

S. (Tamworth).—*Incense.* Vol. ix., pp. 344 and 444.

T. B. E. suggests that the ingredients for compound rhubarb pill should always be kept in the state of powder instead of in mass. (It is now kept by most chemists in both conditions for convenience in dispensing).

Y. Z. (Leeds).—(1.) Ure's *Dictionary of Arts and Manufactures.* (2.) It is impossible to answer the question without knowing all the particulars of the case.

An Apprentice—Translation of the London Pharmacopœia, 1851. Price 2*s.* 6*d.*

J. T. C. E. (Sheffield).—The minor examination comprises the Latin language, Pharmaceutical and General Chemistry, the Chemistry of Poisons, Materia Medica, the Natural History of Drugs, and Botany.

An Associate (Clevedon).—When "Cardamom *seeds*" are ordered, the *fruit*, including the husk, ought not to be used.

A. P. S. (Liverpool).—*Unguentum Hydrargyri Colatum.* This is prepared by liquifying mecurial ointment in a water-bath, allowing the uncombined mercury to subside, and then decanting off the supernatant liquid, which contains part of the mercury in combination.

J. H. (Wetherby).—We are unable to give the information.

A. P. S. (London).—The Secretary of the North British Branch, Mr. J. Mackay, 121, George Street, Edinburgh

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Instructions from Members and Associates, respecting the transmission of the Journal, before the 25th of the month, to the Secretary, ELIAS BREMRIDGE, 17, Bloomsbury Square, W.C.

Advertisements (not later than the 23rd) to Mr. CHURCHILL, New Burlington St. Other communications to the Editor, 15, Langham Place.

THE PHARMACEUTICAL JOURNAL.

VOL. XVIII.—No. X.—APRIL 1st, 1859.

THE FURTHER PROGRESS OF THE SALE OF POISONS BILL.

In our last number, it was stated that the Bill (after several postponements from week to week) was ordered to be committed on Monday, the 28th of February. From that day it was deferred until Friday, March the 4th, and again to Friday, March the 11th, and from that day to March the 18th, when it passed through committee *pro formâ*, and was ordered to be reprinted with amendments, and to be re-committed on Friday, March the 25th. Copies of the altered Bill were not obtained until Thursday the 24th, on which day the Poison Bill Committee met to consider it in its present form. It was found that the Bill, although altered, was not amended, and the defects which appeared to the committee to be most important, were concisely stated in writing, and forwarded to the Secretary of State, with a request for an interview to a deputation. It is needless here to recapitulate in detail the verbal suggestions of the committee, which were precisely in accordance with the principles fully explained in our last and previous numbers. The interview was obtained at three o'clock, P.M., on Friday the 25th, on which occasion Mr. Estcourt received the deputation with courtesy, and entered into the merits of the question at some length. He remarked that the subject had come suddenly upon him, having been transferred from his predecessor, and he had not yet been able to become so conversant with its details as he could have desired; but he acknowledged the force of several of the objections urged by the deputation, which he said would have his serious attention. Some of the difficulties and inconsistencies had not previously occurred to him, and he appeared to be rather imperfectly informed as to the precise meaning (in the present state of the law) of the term Chemist and Druggist. The Bill would be recommitted, when an opportunity would be afforded for reconsidering the points raised, and introducing further amendments.

The various stages in the progress of this extraordinary measure have been from time to time reported in this journal. All that is required to complete the biography is a portrait of the bill as it was originally ushered into existence, and one representing it in the condition to which it is now reduced.

The Sale of Poisons Bill originally appeared before the public in the character of Bombastes Furioso, with his seven-league boots and spurs, two-edged sword, and an ample supply of cutting and maiming instruments, for wounding the feelings and humbling the pride of all persons possessing any pharmaceutical knowledge and experience, and a sledge-hammer, to level with the dust any such persons who might presume to suggest the propriety and prudence of placing the sale of poisons in the hands of those only who possess the requisite knowledge as to their nature and properties. This personification of a Sale of Poisons Bill was ensconced in a chamber of horrors, with bottles, boxes, jars, and galli-pots, marshalled under military discipline, the whole edifice surrounded by a *chevaux de frise* of impossible regulations, and ushered into notice by a flourish of trumpets, announcing a long list of substances for the use of the criminal poisoner, with other information likely to be valuable to him in his business.

By degrees this formidable monster has been shorn of his prominent asperities, until he is now reduced to a form, similar to that of an unfortunate cripple, to be seen at some of the watering-places, having no legs or arms, except two or three small protuberances like roots, with a misshapen head misfitted on an amorphous body, the entire fabric strapped on to a square board with four small wheels, and pushed along the esplanade by a small child.

The bombast of the Sale of Poisons Bill is gone. Its long schedule of horrors

is reduced to thirteen items (a baker's dozen). Opium or laudanum may be sold in doses so nicely adjusted as to be in most cases safe for an adult, although enough to poison several children. The poison chamber and triangular bottles are swept away, but it is provided that poisons are not to be sold in round or oval bottles, which means, if it means anything, that every other shape is held to denote poison. The provision for annihilation after the third offence is withdrawn, but the £100 penalty remains. Poisons may be sold BY children of any age, or BY idiots of every degree, provided always that the PURCHASER has attained the full age of sixteen years, and that the entries in the book are made in due form. Such is the measure which has been tossed about between the two Houses of Parliament from one Minister to another, and which, in passing through its various phases or degrees of impracticability, has caused much trouble and annoyance to all parties concerned, who have been obliged in self-defence to watch its progress, to prevent the passing of something incompatible with the possibilities of business and the wants of the public.

The Sale of Poisons Bill being one of the SMALL questions which scarcely any one in the House either understands or takes any interest in, must, of course, give place to more important measures, such as India Bills, army estimates, Reform Bills, on some of which "the loaves and fishes" hang, and which, therefore, not only claim precedence, but absorb the legislative enthusiasm. Unimportant as these small measures may appear to those who hold in their hands the destinies of a great nation, they are objects of no little anxiety, and sometimes of alarm, to the parties threatened with legislative interference; and while deputations from the country are attending at the House, or seeking interviews with their members, and memorials with proposed amendments are being prepared and sent to London, the bill is quietly put off from week to week, as if it were a matter of no consequence. Such treatment reminds us of the case of a boy who smashed his finger and was sent to one of the large metropolitan hospitals; amputation being thought necessary, he was admitted as an in-patient, with that object. The operating day arrived, voices were heard on the stairs (the surgeon and assistants going their round), the boy screwed up his courage and was ready; but the hum of voices receded—they had gone out at another door, and all was still. The nurse explained the cause, "There was such a CAPITAL operation going on in the theatre, that all the gentlemen could not be kept waiting on account of a boy's finger." Another week passed, a false alarm, but the finger remained in a poultice. The next week the group of learned men stood by the bed, the surgeon had his instruments ready, but was reminded that it was past — o'clock. He said, "Then we shall not have time; I'll attend to this case on Tuesday—no, that will not do, there is the —— case coming on. Then this will wait till next week. How do you feel, my boy?" "Pretty well, thank you, but I shall be glad when it's all over." "Very well, be a good boy, and you shall have it off next week."

DAMAGES AGAINST A CHEMIST—TRIAL BY JURY—REACTION IN PUBLIC OPINION—TESTIMONIALS OF CONDOLENCE.

To those who consider that severity of punishment and penalties *in terrorem* constitute the essence of good legislation, it may be satisfactory to find that, even in the present state of the law, a Chemist may be liable to a verdict against him, with £1400 damages, for injury resulting from the use of a poison sold by him in one transaction across the counter. There are others, however, who think that purchasers as well as vendors should be required to use precautions in reference to poisons, and who consider the revision of the sentence at a new trial as nothing more than an act of justice to the defendant.

A report of the case (Black *v.* Elliot) will be found in another part of this number, and it has also been very generally reported in the metropolitan and provincial papers, in some instances with rather severe comments on the ver-

dict. We can scarcely conceive it possible that such a verdict will be confirmed at the new trial about to take place, and the elaborate investigation by Dr. Macadam and Mr. Gamgee, reported in another part of this number, also tends greatly to strengthen the position of the defendant, as no injury was occasioned to any of the animals experimented upon, although the wash was subjected to a much more severe test than would have been justified by Mr. Elliot's instructions.

On a review of the case as stated in the reports of the trial, it appears that the purchaser, as well as the vendor, knew that the compound sold was a deadly poison, so rapidly fatal in its effects, that immersion in it for less than a minute was sufficient to destroy animal life, on which account it was used as the most effectual remedy against certain kinds of vermin in sheep. It was proved that the defendant had sold within three years at the rate of 500 powders per annum, each powder being sufficient to make the wash for fifty sheep; and of the 25,000 sheep so dipped, not one case of accident or misadventure was reported. The plaintiff had not previously used the wash, but, in consequence of an advertisement, purchased the materials, with which the usual printed directions were given, and such verbal information as at the time was supposed to be requisite and sufficient. It was proved that the dipping had been performed with such rapidity, namely, at the rate of about three sheep in two minutes, that several experienced farmers thought it would be scarcely possible to drain the fleeces effectually from the surplus fluid in the time. The sheep were then turned into pasture, and the drippings from the wool, washed by rain in the night, had contaminated the herbage with arsenic, which was proved by analysis to be present in some of the grass and sods from the field.

This involved the question in still greater difficulty; for before trying the issue between the plaintiff and defendant, it was important to decide whether blame attached to either party, or whether the disaster was attributable to the state of the weather, and consequently to be considered as a misfortune arising from no fault. The rapidity with which the operation was performed naturally raises the question, whether due and sufficient precautions were observed in the process, on which considerable doubt is thrown by the evidence in that part of the case. It is proved that the same kind of composition has been used successfully for many years, and to a large extent, which is also confirmed by the experiments above referred to. No case of an accident or misadventure is brought forward, except on this last occasion, when 850 sheep died of arsenical poisoning, being nearly all that were dipped. In a former case, *Huggins* v. *Froom* (Exeter District County Court, *Ph. Journ.*, vol. xi., p. 283), the plea of the plaintiff was that defendant was responsible, on account of a warrantry expressed or implied in the terms of the directions for using the wash. The vendor of the composition had recommended it as being superior to that prepared and sold by another Chemist, and had verbally stated that if used according to the directions, it would not injure the sheep. It was ruled by the judge, that such representation made at the time of purchase, and with a view of recommending the purchase, became in fact a part of the contract. The only question in that case, therefore, was whether the directions for using the compound had been strictly followed. It appeared from the evidence that this had been done generally, but with regard to some matters of detail, a doubt existed. Consequently, although the verdict was for the plaintiff, the damages were modified. In the Burton case there was no evidence of warrantry or of misrepresentation on the part of the defendant, while on the other side there were strong grounds for believing that the operation of dipping was performed with a rapidity incompatible with due care and precaution. Yet the jury ignored this latter circumstance, and threw the entire responsibility on the vendor of the poison.

Trial by Jury is extolled as one of the bulwarks of our liberties, and its introduction as an element into our courts of law is revered as an important epoch in the history of the country. In ancient times, when sovereigns were

habitually despotic and tyrannical, and judges no less venial and corrupt, the intervention of trial by jury as a safety-valve between the oppressors and the oppressed was an important step in securing to some extent the liberty of the subject. In numerous instances, probably in a majority, it may be an effectual and satisfactory mode of arriving at the ends of justice. In others, however, and of this class we think the Burton sheep poisoning case is an example, this mode of trial is unsatisfactory and ineffectual, on account of the difficulty, we might almost say the impossibility, of finding twelve jurymen qualified to adjudicate in a matter of so much intricacy and delicacy, free from local or personal bias, and in other respects competent to ensure impartial justice. In an agricultural district, a certain amount of sympathy or fellow feeling among the farmers is natural, and the chemical intricacies of the question not being understood with reference to the limits between a safe and a hazardous mode of applying a poisonous compound, it was not surprising that the *primâ facie* impression should be unfavourable to the defendant. Yet it was strange that the very questionable mode in which the process was performed was not thrown into the scale in mitigation of the damages. On the contrary, the chemist against whom no negligence or carelessness is proved, is made responsible for the entire loss, while the question, "Would it be possible safely to dip 800 sheep at the rate of three in two minutes?" remains unanswered. The jury were, we presume, impressed with a belief in the justice of their verdict, but the question is, were they competent and impartial judges? It is well known that local prejudices and customs are sometimes so inherent in the mind as to warp the judgment and make an unbiased decision almost an impossibility. For example, an *Englishman* being a party to a suit in Wales about to be tried by a *Welsh* jury, would act wisely to consent to any compromise rather than go into court. By this means he would save the costs of the action. Instances also occur where religious or political bias or party spirit interferes with the operation of trial by jury, which thereupon ceases to be in practice what it is in theory. For these exceptional cases, and especially where questions of delicate chemical or medical science are involved, the intervention of an enlightened scientific tribunal would promote the ends of justice.

THE REACTION IN PUBLIC OPINION after the first impulse of excitement has subsided, sometimes goes from one extreme to the other, and as the general impression changes, it can scarcely be supposed that a jury, selected from the public at large, could escape the indirect influence of such bias. A farmer, having lost eight hundred sheep by a misadventure, claims the universal sympathy of his neighbours, whose primary desire is that of indemnifying him for his loss, but when that has been done at the expense of another party, the sympathy goes in the other direction, especially if the culpability of the second party has not been clearly proved. We should, therefore, not be surprised to see the decision reversed at the new trial, or, at all events, the damages very considerably reduced upon a reconsideration of the facts of the case, especially after the additional evidence obtained in the course of subsequent investigations.

A remarkable instance of reaction in public feeling has lately been brought under notice, and is revealed in the following advertisement from the *Leeds Times* of March 19:—

"BRADFORD POISONINGS.—Important to chemists and druggists and the public, who are respectfully informed that a COMMITTEE has been formed for the purpose of receiving SUBSCRIPTIONS on behalf of Mr. Charles Hodgson, chemist, Shipley, who was unjustly persecuted on account of that lamentable occurrence." [This is followed by the names of several persons by whom subscriptions are received.]

At the time of the catastrophe, when more than two hundred persons were suffering from the effects of the poison, and almost every day added to the list of fatal cases, the primary impulse was to trace the mischief to its source and punish the offender, the supposition that such a disaster could occur without the exist-

ence of a criminal somewhere, being scarcely entertained. When doubts and difficulties arose as to the prospect of obtaining a conviction against *somebody*, the newspapers teemed with leading articles deprecating the imperfect state of the law in providing no suitable punishment for such wholesale poisoning; and the case was cited in the House of Commons, by the Secretary of State, as one reason among others for the urgency of a Sale of Poisons Bill, which he therefore brought in on the first day of the session. The two parties implicated in the Bradford case were the apprentice, who went to the wrong cask by mistake, and his employer, who kept arsenic exposed in a cask, among other things, *without being properly labelled*. The case against the boy broke down at the beginning of the trial, and the other after a short argument. A conspicuous label with the words "Arsenic Poison" would have prevented the accident, but neither the law nor the custom of the trade could sustain a verdict of manslaughter on account of the omission. Hodgson was therefore acquitted, a result for which we were quite prepared, and the propriety of which is not disputed; but we cannot imagine in what manner, or by whom, the "persecution" has been perpetrated calling for public sympathy in the form of a TESTIMONIAL OF CONDOLENCE.

The existence of such a proposition may be useful, by directing attention to a very important principle in legislation—namely, the fact that excessive penalties defeat their own object by enlisting the sympathies of the public on the side of the offender. As soon as the public have an idea that the punishment, whatever it may be, exceeds the measure of justice, the parties convicted under such law are considered persecuted men. In the Bradford case, although the accused was acquitted, he is an object of condolence on account of a notion that he was "unjustly persecuted."

What kind of testimonial is due to Mr. Elliot, as an expression of condolence for the loss of £1400 in damages, for the improper use of his sheep-wash in his absence, by parties over whom he had no control or jurisdiction? If the responsibility of the vendor were to follow the poison to its destination in this manner, the only way to be safe would be to refuse to sell any poison at all.

THE LEAD PANIC AT HASTINGS AND ST. LEONARDS.

It sometimes happens that a person having recently taken up his residence at a place, viewing everything with a fresh eye, and unbiased by local habits and prejudices, becomes sensible of influences or peculiarities which may have escaped the notice of the older inhabitants. This is more especially the case in regard to sanitary matters, over which it is the province of medical practitioners to keep a watchful eye, with a view of removing, with as little delay as possible, all preventable causes of epidemics, or other disease. Sometimes a Medical Officer of Health on visiting a sub-district, or passing through some other locality, whether accidentally or on official business, detects the existence of a nuisance or defect to which no importance had previously been attached; and in numerous instances the introduction of proper sanitary regulations has been followed by a diminished rate of mortality, as shown by the Registrar-General's returns. The subject of Sanitary Reform having been reduced to a regular system, with extensive machinery for obtaining correct statistical information throughout the country, and having become a department of the Government, every facility now exists for investigating and tracing to its source any known or supposed cause of sickness or mortality; and information on such matters, showing a *primâ facie* case for inquiry, and transmitted in due form to the Home Office, is sure to receive prompt attention on the part of the Secretary of State. Such was the origin of a rather elaborate investigation which has lately taken place respecting the supposed contamination of the water in Hastings and St. Leonards with lead, and which has excited much interest and some degree of alarm in the neighbourhood.

The following letter from Dr. Garrett to the Home Secretary is the document which led to the investigation:—

Hastings, Nov. 16th, 1858.

Sir,—Permit me to eall your attention to the following eireumstances, and to solicit your adviee on the subject. The towns of Hastings and St. Leonards are supplied with water by the corporation, which is carried in iron mains through the streets, but eonveyed from them into the dwelling-houses by *leaden pipes*. From the shortness of the supply the corporation compelled every householder to *provide tanks* for the reception of water for their daily supply. I think I am right in saying that forty-nine out of fifty of these tanks are leaden, the slate tanks existing only in private houses. From the many eases of eolic, and other disturbed states of the digestive organs I was led to classify such eases, and upon inquiry I found that in all instanees in which much indisposition oecurred *leaden tanks were in use*. I have nearly lost several eases with repeated colie and its eonsequent imutrition (in other words, starvation from arrested digestion), each one exhibiting manifest symptoms of LEAD POISONING. Sueh persons have immediately recovered on my desiring them to send for their water from the street pumps, and keeping them on a diet made from that water under their own eyes. I have examined many speeimens of water from different lodging-houses, and have found lead in eaeh of them; indeed, in one specimen, which I have lodged with the mayor, the water looks positively milky from the presence of earbonate of lead. This water is filtered for the use of the house, whereby only the thick portion is removed, the soluble part, holding salt of lead in solution, being left for eonsumption by the inhabitants of the house—visitors as well as the occupiers themselves. It is a notorious fact that the water supplied in these towns has a peculiar affinity for lead, which is much increased at this time of the year, when a large quantity of vegetable matter in a state of decay impregnates the water derived from the springs, and furnishes in abundanee the neeessary *carbon* to unite with the lead in furnishing that deadliest of its salts—the carbonate of lead. Plumbers say that an *inch leaden tank* will be eaten in holes in three years. As weak persons (especially those who flock to these towns for health and recovery) are most amenable to the influenees of lead, this is a subject of *deep importance*. The eorporation's powers are limited to eompelling householders to *provide tanks:* they cannot enforce any partieular *kind of tank*. May I ask you, Sir, where powers are to be songht to remedy these evils affeeting human life, to whieh I have humbly called your attention? An early reply will be most thankfully received, as the Water Committee meets on Friday next.

In mueh haste, I am, &e. &c.,

C. B. Garrett, M.D.

To the Right Hon. the Secretary of State for the Home Department.

We have quoted this letter entire, as any account of the investigation and the result would be imperfect, and in some parts might almost appear frivolous, unless accompanied by the data, in the words of the author, as transmitted to the Home Office. The entire statement was startling, and some of its details scarcely credible, but it was the *bonâ fide* report of a medical practitioner, purporting to be founded on abundant statistical evidence obtained in the eourse of his praetice, and eonfirmed by collateral testimony. The ease was urgent; the letter was written "in much haste." It was a question of health—in fact, of life and death—affecting the sanitary reputation of a locality previously supposed to be remarkable for its general salubrity, and therefore very extensively resorted to by invalids. It appeared extraordinary that other medical men, residents in Hastings or St. Leonards, for many years, had failed to notice this fearful tendency to lead poisoning, which a brother practitioner had discovered almost immediately on his taking up his abode in the neighbourhood.

An extensive and voluminous correspondence ensued, commencing with the transmission of a copy of Dr. Garrett's letter from the Home Office to the Mayor of Hastings, with a request for information, and an inquiry as to the course about to be adopted by the Corporation. The Corporation entered upon the inquiry with a determination to trace it to its source and to afford every facility for arriving at the truth, regardless of expense. The town clerk of Hastings, the officers of the Water Company, the local Board of Health, and various other parties likely to throw any light on the question, were in communication with the Corporation. The ease was specially laid before the principal medical practi-

tioners, and a circular was issued by the East Sussex Medico-Chirurgical Society to each of its members practising in the borough, enclosing the following question:—"What number of cases of sickness caused by the drinking of water contaminated by lead have you met with in your own practice during the past two years?" It would be tautology to quote the answers, which being twenty in number, were to this effect: "none," "not any," "none during 30 years," "none during 11 years," &c. &c.

While this correspondence was in progress, the Hastings Local Board of Health, under instructions from the Privy Council, requested Dr. Garrett, as the mover in the matter, to furnish information as to the precise locality of each house where cases of sickness had arisen with symptoms of lead poisoning, in order that a precise specification of each contaminated cistern might be obtained, that the Board might procure from each a specimen of the water in such a state as it was actually used by the occupiers of the houses. Dr. Garrett, in his reply, after alluding in general terms to his extensive professional experience in lead poisoning, proceeds:

Cases occurred to me *here* in which all the symptoms of lead poisoning became *so palpably* manifest to me and other physicians elsewhere, that I sought for lead in the water, *and I found it!* I therefore became, as you know, "the mover in the matter." To my utter amazement and disappointment I learned that my acts and motives had been violently assailed by some members of the Town Council, and epithets applied to me with a taste I shall not attempt to characterize. In my own defence, I sent two specimens of water taken from leaden cisterns to Dr. R. D. Thomson, of St. Thomas's Hospital, for analysis: he "*found them to be contaminated with a very considerable quantity of lead, sufficient to produce dangerous disease, &c.*" Take my word for it, that that man is not an honest supporter of the interests of the town who slavers the beauty with flattery and idolatry only, and conceals her imperfections. Let them rather be sought out in a kindly and delicate manner, and be properly remedied. Considering the extremely false and painful position in which I have been placed by some members of the municipal body, I beg to decline having my name associated in any manner for the future with anything connected with the water supply of Hastings. * * * *

Dr. Garrett had discovered, and admitted in a previous letter, addressed to the Mayor of Hastings, Dec. 7th, that he had been "led into unintentional error in two or three particulars," in his letter to the Secretary of State, but attributes the blame to his informer, who, he says, "*ought* to have known better." He does not, however, retract the *gravamen* of his charges against the water supplied to the inhabitants of Hastings, although he declines, on account of some alleged personal disagreement, to permit his name to be in future associated with the subject.

But the Local Board of Health, and other authorities, could not allow the matter to rest here. The sanitary reputation of the locality had been assailed. The statement that forty-nine out of fifty of the tanks in Hastings and St. Leonards were leaden tanks, and sources of disease to the extent described in Dr. Garrett's letter to the Secretary of State, such a statement was either a timely and providential warning of impending danger, or it was a libel upon the borough. In a watering-place resorted to by invalids, recommended by the medical profession for the purity of its air and other local advantages, a rumour of this description, unless promptly and effectually neutralized, was calculated to inflict serious damage, by inducing the visitors to leave the lodging-houses vacant, and seek some less precarious locality. It was therefore necessary to continue the investigation until either a complete refutation could be given, or some effectual remedy adopted in the event of any foundation for the allegations being found to exist. It was not supposed, of course, that the Borough of Hastings was exempted from the laws of nature which prevail in every other place where lead is used to convey or contain water. Sometimes from gross negligence and the accumulation of decomposing organic matter, or from a piece of putty or lime, or of some other metal falling into a lead cistern, a chemical or

galvanic action is set up, which promotes the solution of the lead. To such casualties all must be liable who use leaden pipes and cisterns without taking proper precautions; and in some rare instances the effect may be purely accidental, and the cause unexplained. But the question at issue in this investigation, was whether the tendency to lead contamination, and the consequent danger of lead poisoning, exist in the borough of Hastings to a greater or less degree than in the average of other places.

On the 31st January, seven samples of water, obtained from different reservoirs and tanks, were forwarded by the East Sussex Medico-Chirurgical Society to Dr. A. S. Taylor for analysis.

The report of the analysis, dated February 14th, contains a minute description of the several samples. Those marked 1, 3, and 5, taken from reservoirs, were furnished with reference to the question, whether they had "any PECULIAR AFFINITY FOR LEAD, *i.e.* any chemical action on that metal by which effects noxious to health may be produced?" to which the following is the answer:—

"The affinity of these waters for lead, or the degree in which they act on that metal under the most favourable circumstances, is exceedingly small, being less than that manifested by many soft (lake, river, or spring) waters used for the supply of towns. The chemical action, so far as it went, appeared to have reached its full intensity in forty-eight hours, and to have then ceased."

Samples 2, 4, 6, and 7, having been taken from leaden cisterns, the question to be solved was this—"*whether they are contaminated with a very considerable quantity of lead, sufficient to produce dangerous disease.*" The answer is as follows:—"Each of the samples was carefully tested at two separate intervals of time for the presence of lead. There was not a trace of that metal in any one sample. A water artificially impregnated with lead in the proportion of one eightieth of a grain of this metal in a gallon, was tested with them side by side, and the lead in this small proportion was distinctly revealed. Hence it follows that they contain no lead, or the quantity present is too small to be appreciated by the most delicate tests, or to produce dangerous (lead) disease." It is further stated, as a general remark, that "when a water in the entire state gives no evidence of the presence of lead by a test which will reveal the presence of one hundredth part of a grain in a gallon, it may be practically regarded as free from that metal, and innoxious. By the concentration of a gallon, it is possible that some traces of lead derived from a leaden pipe or cistern may be found in it; but in a sanitary point of view, this proceeding is seldom resorted to, and is not usually considered necessary." Dr. Taylor also reported in detail the other ingredients found in the several samples of water in different proportions, namely, sulphate and bicarbonate of lime, and chloride of sodium. In three instances the bicarbonate predominated, others contained scarcely a trace of that salt. The general character of the waters was rather above the ordinary degree of purity.

At one time it was anticipated that a very large number of analyses would be required, and that it might be necessary for Dr. Taylor to make special arrangements to enable him to proceed with six or more waters at the same time; but the negative result of the first report, coupled with the medical testimony in the locality, somewhat altered the complexion of the affair. On the 17th of Feb., Dr. Garrett was informed by the Hastings Local Board of Health, that the specimens of water sent to London for analysis, had not been found contaminated with lead, and that it was therefore necessary to ascertain from what source he obtained the water which he stated was analyzed by Dr. Thomson, and found to be so contaminated. He was requested to furnish that information on the following morning, in order that no time might be lost in having a final report made to the Privy Council.

Dr. Garrett's reply diverges into a personal dispute between himself and some of the Town Council and Water Committee. He says, "Would any man believe, that in a place characterized for its piety, I should have been assailed with such

ill feeling as I have met with?" He demurs to Dr. Taylor's report, and states his determination fearlessly to stand in the fore ranks of those who will defend the public health from lead poisoning, but makes no allusion to the question whence came the specimens of water analyzed by Dr. Thomson, and found contaminated with lead, to which question this letter purported to be the answer. Another communication was therefore addressed to Dr. Garrett, on behalf of the East Sussex Medico-Chirurgical Society and the Hastings Local Board of Health, reminding him of the omission, and proposing that he should take the samples himself, at any time and place that he might appoint, in the presence of a competent witness, and that they should be sealed and transmitted to the analyst for examination.

No answer was received to this letter.

In a subsequent communication addressed to the Mayor of Hastings, Dr. Garrett continued to attribute the course of events to a personal cabal against himself, and says, "Depend upon it, if necessary, the public shall judge, and, I doubt not, will protect a single philanthropist from the unseemly attack made on him, spurred on by the jealousies and animosity of those who ought to know better."

Under these circumstances there was nothing left to be done. After a most careful and searching investigation by competent parties, and an analysis of samples from various tanks and reservoirs, the allegations against the water had broken down, the first mover in the business had withdrawn from the inquiry, and refused to give any further information or assistance, and no other person had been able to find any appreciable trace of lead in the water, or to confirm the statement as to the alleged prevalence of the symptoms of lead poisoning. Accordingly, the Committee of the East Sussex Medico-Chirurgical Society presented a report to the Members, detailing at some length the steps that had been adopted and the correspondence which had taken place, with the result of the inquiry, which is in substance as follows:—1st. That the water of Hastings and St. Leonards, instead of having a remarkable tendency to act upon lead, is rather below the ordinary average of drinking waters in regard to its affinity for that metal. 2nd. That the water supplied to the inhabitants is not "contaminated with lead in such quantity as to be likely to produce dangerous disease." On the contrary, none of the specimens examined contained a trace of lead which could be detected by the most delicate chemical tests. 3rd. No evidence of a single case of colic or the symptoms of lead poisoning in the borough could be obtained.

The entire report, with the correspondence and documents relating to it, having been transmitted to the Lord President of the Privy Council, the minds of those who had been engaged in this important investigation were relieved from a great weight of anxiety, the stigma on the water was removed, and the salubrity of Hastings and St. Leonards satisfactorily established.

One of the parties concerned, however, was not satisfied at this result. Dr. Garrett, in a letter to the Mayor of Hastings, dated March 1, 1859, complains that he was not consulted in the first instance, instead of the Medical Society. He says he declined to give information to the turncock against certain houses, but adds—

I sent word by him to the Water Committee, that if any one of their body would call on me, I would show him the specimens of water I had analyzed, tell him where I had obtained them, and give any information in my power. This offer, as you know, was never accepted. Is it decent or right that, in asserting a great principle, I should be driven to stigmatise certain houses only? Had my offer been accepted, the truth must have come out. Here was their dodge. I assert that the leaden tanks are eaten away rapidly. Who eats them? The water, clearly. Will any honest man, then, condemn me for *privately* calling the attention of the Water Committee* to such a terrible circumstance? Do not all these proceedings bear a con-

* Qy. Secretary of State?

struction of an advocacy of leaden tanks and filthy water, as well as of a medical cabal against a successful brother? Mark me, as sure as the God of truth and justice is evidenced in a righteous cause, this cabal will fall back upon those who persecute me. No, sir, there is too much of the medical influence at work. A surgeon in this town declared that "now we have got our Don of a Doctor, and we will drive him out of Hastings."

Having discovered that he had been treading on delicate ground in his onslaught on the lodging-house keepers, for poisoned water and dirty tanks, &c., the doctor, in his letter to the Mayor (which he sent for publication), very judiciously tones down the asperity of his former remarks by stating that "the holders of lodgings are deep *sufferers* from causes over which *they have no control*. A more respectable body of inhabitants does not exist than the lodging-house keepers of these towns, kind, honest, attentive, to a degree that has gained them a wide-spread renown; it is a cruelty to them to be made the victims of any such circumstance."

The prophet JONAH in the performance of his mission, went into the city of Nineveh, and he cried and said, "Yet forty days, and Nineveh shall be overthrown."

He afterwards went out of the city and sat in a booth on the east side of it "till he might see what would become of the city."

It came to pass that the calamity was averted.—Nineveh was preserved.

"But it displeased Jonah exceedingly, and he was very angry."

THE ADULTERATION OF FOOD.

After several years of incubation, the Bill for Preventing Adulteration has appeared, and a copy will be found in another part of this number.

What may be the fate of this Bill is at present very uncertain; the subject has ceased to excite any general interest. The agitation which has already taken place has had the good effect of opening the eyes of the public to many of the customary frauds, and thus enabling those to obtain genuine articles who will take the trouble, or who are willing and can afford to pay a fair price. The poor, who have not the ability to discriminate between the degrees of purity or adulteration, and who cannot afford to go from one place to another in search of the best articles of food, are still to a great extent at the mercy of those tradesmen who supply populous districts, and who regulate the quality of what they sell by their own ideas as to the wants and habits of their customers.

This Bill affords the means of rectifying some of the existing evils by defining a mode in which the offenders may be detected, exposed, and punished; but it is doubtful whether its influence will be very generally exercised, as the provisions are permissive, not compulsory, with reference to the question of bringing the Act into operation in any particular locality. In some places the authorities, urged by parties having an eye to appointments under the Act, may bestir themselves, but when it is ascertained that the machinery for carrying the Act into effect is attended with expense, a reaction may be anticipated similar to that which occurred in reference to free libraries, which were introduced to public notice under favourable auspices and with every appearance of public enthusiasm, but when the question was brought before the ratepayers as a money question, in their several localities, the cry of "*Keep down the Rates*" usually prevailed.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

FINANCIAL STATEMENT—*From 1st January, to 31st December*, 1858.

RECEIPTS.	£	s.	d.
Balance in Treasurer's Hands	162	13	3
Life Members' Fund:			
22 Life Members' Fees 147 0 0			
Interest 38 15 8			
	185	15	8
Benevolent Fund:			
Subscriptions 54 13 0			
Interest 147 6 7			
	201	19	7
Government Securities, Interest ...	165	1	1
Rent.....	202	12	6
Fees:			
25 Pharmaceutical Chemists 141 15 0			
42 Assistants 170 2 0			
73 Apprentices..... 153 6 0			
	465	3	0
Subscriptions:			
377 London Members ... 395 17 0			
1685 Country Members...1769 5 0			
194 Associates 101 17 0			
121 Apprentices..... 63 10 6			
	2330	9	6
Arrears of Subscriptions	81	18	0
Lecture Fees.....	12	12	0
Sale of Journals	4	4	0
Insurance	20	0	0
Balance of Petty Cash due to Secretary	5	15	10
	£3838	4	5

EXPENDITURE.	£	s.	d
Benevolent Fund:			
Investment 95 18 7			
Gratuities 95 0 0			
	190	18	7
Conversazione 43 8 11½			
Pharmaceutical Meetings 14 11 2			
Repayments..... 17 8 6			
	75	8	7½
House Expenses	25	18	10½
Rent, Rates, Taxes and Insurance (including £50 to Secretary for Rent)	460	0	9
Alterations and Repairs	108	2	3
Fixtures and Fittings	35	19	4
Museum.....	69	15	5
Library	45	7	6½
Office Furniture	20	0	0
Stationery	15	18	10½
Printing and Engraving	91	16	0
Advertisements	1	1	0
Journals.....	712	2	11
Do. Postage and Delivery of	177	3	6
Postage	56	13	11½
Carriage	1	6	2
Collector's Commission.....	38	0	10
Travelling Expenses, Country Members	118	4	1
Salary, Secretary.....	200	0	0
Pension to late Secretary.....	150	0	0
Gratuity to Mrs. Morris	10	10	0
Wages.....	165	10	6
Expenses of Society in Scotland ...	53	2	10
Board of Examiners	76	13	0
Professor of Chemistry and Pharmacy, including duties as Curator in his department, and payment of Assistant	300	0	0
Professor of Materia Medica and Botany, including duties as Curator in his department, and payment of Assistant	250	0	0
Subscription to Royal Botanical Gardens	21	0	0
Prize Medals, &c.....	13	11	0
Law Costs, &c.....	57	8	0
Insurance, Dr. Redwood's claim ...	13	0	0
Repayment to Secretary, Petty Cash, due 31st Dec., 1857	8	0	10½
Balance in Treasurer's hands.....	275	9	6
	£3838	4	5

We, the undersigned Auditors, have examined the Accounts of the Pharmaceutical Society, and find them correct agreeably with the foregoing statement, and that, as shown by the Books of the Society, there was standing in the names of the Trustees of the Society, at the Bank of England, on the 31st day of December, 1858:

	£	s.	d.
On Account of the General Fund, New 3 per Cents.	5643	0	2
Benevolent Fund, 3 per Cent. Consols.....	5134	9	3
Life Members' Fund, 3 per Cent Consols	1325	18	7
And at that date there was due to the Life Members' Fund	281	8	0

JOHN CARR,
WILLIAM BOWER,
ARTHUR BOWDLER HILL,
JAMES B. BARNES,
ADOLPHUS FREDERICK HASELDEN,
} Auditors.

24th February, 1859.

SUBSCRIBERS TO THE BENEVOLENT FUND, 1858.

	£	s.	d.
Althorp, James, Stamford	0	10	6
Arnold, Edward, Norwich	0	5	0
Atkins, Francis Thomas, Deptford	2	2	0
Balmer, John, 94, St. John's St. Road	1	1	0
Barry, George, Northampton	0	10	6
Beach, Thomas, Bridport	0	10	6
Bell, Jacob, 338, Oxford St.	1	1	0
Best, John D., 26, Suffolk St., Pall Mall	1	1	0
Blake & Sandford, 47, Piccadilly	1	1	0
Bolton, Thos., Tenterden	0	5	0
Bond, John, Yarmouth	0	7	6
Bond, Charles, Leamington	0	5	0
Boyce, John Pierce, Chertsey	0	5	0
Bradley, John, 21, Belgrave Rd.	0	9	6
Brailey, Charles B., Heavitree	0	5	0
Brown, Henry, Oxford	1	1	0
Carr, Wm. Graham, Berwick	0	5	0
Cartwright, Wm., Newcastle-under-Lyne	0	10	6
Chater, Edward M., Watford	1	1	0
Christopher, Wm., Crickhowell	0	5	0
Cole, John, New Road, Camberwell	0	10	6
Cooper, George, Exeter	0	5	0
Cullen, William, Walworth	0	10	6
Cupiss, Fras., Diss	1	1	0
Darby & Gosden, 140, Leadenhall Street	5	5	0
Davies, Charles, 11, Claremont Place, N. Brixton	0	5	0
Davies, Henry E., 43, Wood Street, City	0	10	6
Deane, Henry, Clapham	1	1	0
Dyer, Thos., Exeter	0	5	0
Eddy, Charles William, 30, Crown Street, Finsbury	1	1	0
Evans, Messrs., 60, Bartholomew Close	1	1	0
Fox, William, 48, Church St., Bethnal Green	0	10	6
Gedge, William S., 77, St. John Street	0	5	0
Gilpin, Benjamin, Newcastle-on-Tyne	1	1	0
Glover, George, 19, Goodge St.	1	1	0
Goodwin, John, Lower Clapton	0	10	6
Goodbarne, Thomas, 13, Charles Place, Hoxton	0	10	6
Haselden & Fisher, 18, Conduit Street	2	2	0
Hills, Thomas H., 338, Oxford Street	1	1	0
Hudson, William B., 27, Haymarket	1	1	0
Hurst, William T. H., Hempstead	0	5	0
Husband, Matthew, Exeter	0	5	0
Jackson, Thos., Manchester	0	10	6
Knight, John, Cambridge	0	10	6
Leggett, John Tudway, Wareham	0	5	0
Lescher, Joseph S., 60, Bartholomew Close	1	1	0
May, John, Battersea	0	10	6
Meggeson, Geo., 61, Cannon Street	0	10	6
Middleton, Francis, 338, Oxford Street	0	10	6
Moore, James Lodge, 1, Craven Street, Westbourne Terrace	0	10	6
Nind, George, Wandsworth	0	10	6
Noakes, Richard, Brighton	0	10	6
Otter, William, Bloxham	0	5	0
Palk, John, Exeter	0	5	0
Parsons, Robert, 98, York St.	1	1	0
Penrose, Arthur W., 7, Amwell Street, Clerkenwell	0	5	0
Pocklington, James, Sydenham	0	10	6
Pollock, Thos., 122, Fenchurch Street	1	1	0
Powell, John, Shaftesbury	0	10	6
Pratt, John, Chichester	0	10	6
Proctor, William, Newcastle	1	1	0
Ranken, William, Kilmarnock	1	1	0
Rastrick, Joseph L., Southsea	0	5	0
Rea, Edwd., 115, Wardour St.	1	1	0
Rea, James S., 115, Wardour Street	0	5	0
Redfern, John, Ashby-de-la-Zouch	1	1	0
Robinson, James Mowld, Beverley	0	5	0
Sadler, William, 13, Norton Folgate	0	10	6
Shirley, John George, 1, Westbourne Grove, Bayswater	0	10	6
Smith, Wm. Frederick, Keen's Row, Walworth	0	10	6
Spencer, Charles, Gravesend	1	1	0
Starkie, James, 4, Strand	1	1	0
Store, John, Exeter	0	5	0
Tanner, Nicholas, Exeter	0	5	0
Tucker, Charles, Bridport	0	10	6
Watlock, John D., Wandsworth	0	10	6
White, Messrs. D. and E., 19, Park Terrace, Regent's Park	1	1	0

AT A MEETING OF THE COUNCIL, 2*nd March*, 1859,

Present—Messrs. Bell, Bird, Bottle, Brew, Bucklee, Davenport, Deane, George

Edwards, J. B. Edwards, Hanbury, Hollier, Meggeson, Morson, Peacock, Sandford, Squire, Standring, and Waugh, the following were elected

MEMBERS.

CHICHESTER.....Long, William Elliott
KILMARNOCK .....Borland, John
PLYMOUTH .....Kirkman, George B.
READING .....Collier, Lindsey William
RIPON .....Chrispin, William

MAJOR EXAMINATION, 15*th March.*

Anthony, John Lilley.....Bedford
Southall, Joseph Sturge.....Leeds

MINOR EXAMINATION.

Barnes, Edwin .....Durham
Buzzard, Thomas Hardy .....Spilsby
Haines, John Jenkins.....Bromsgrove
Perrot, Pierre Bénoni .....Mauritius
Sutton, Charles William.....Lincoln

REGISTERED APPRENTICES.

NAMES.	RESIDING WITH	ADDRESS.
Berrell, Charles	Mr. Farmer	40, Westminster Road, Lambeth.
Ellis, Henry Brook	Mr. Collings	Bristol
Greaves, William Samuel	Mr. Greaves	Ironville
Lucas, Philip John	Mr. Martin	Guildford
Moysey, William	Mr. Moon	Ilfracombe

EXAMINATIONS IN SCOTLAND.

THE Board of Examiners propose to hold their next meeting in Edinburgh on the second Wednesday of April, within the Hall, 51, George Street, at 11 o'clock A.M.

Parties who intend to present themselves for examination, are requested to communicate with the Secretary a fortnight before the day appointed.

Edinburgh, 121, *George Street*, *Feb.* 19, 1859. JOHN MACKAY, *Secretary.*

BOTANICAL PRIZE FOR 1860.
A SILVER COUNCIL MEDAL

Is offered for the best Herbarium, collected in any part of the United Kingdom, between the first day of May 1859, and the first day of July, 1860; and should there be more than one collection possessing such an amount of merit as to entitle the collectors to reward a second prize, consisting of a Bronze Medal, and also Certificates of Merit, will be given at the discretion of the Council. In the event of none of the collections possessing such an amount of merit as to warrant the Council in awarding Medals or Certificates, none will be given.

The collections to consist of Phanerogamous plants and Ferns, arranged according to the Natural System of De Candolle, or any other natural method in common use, and to be accompanied by lists, arranged according to the same method, with the species numbered.

The collector to follow some work on British Botany (such as that of Babington, or Hooker and Arnott), and to state the work which he adopts. The name of each plant, its habitat, and the date of collection, to be stated on the paper on which it is preserved.

Each collection to be accompanied by a note, containing a declaration, signed by the collector, and certified by his employer, or a Pharmaceutical Chemist known to the collector, to the following effect:—The plants which accompany this note were collected by myself, between the first day of May, 1859, and the first day of July, 1860, and were named and arranged without any assistance but that derived from books.

In estimating the merits of the collections, not only will the number of species be taken into account, but also their rarity or otherwise, and the manner in which they are preserved, and should a specimen be wrongly named, this will at once be erased from the list.

The collections to be forwarded to the Secretary of the Society, 17, Bloomsbury Square, on or before the first day of August, 1860, endorsed, "Herbarium for Competition for the Botanical prizes."

If required, the collection will be returned after competition, with the exception of that of the successful competitor for the Silver Medal, which will be added to the Herbarium of the Society.

No candidate will be allowed to compete unless he be an Associate, Registered Apprentice, or Student of the Society, or if his age exceed twenty-one years.

FREE ADMISSIONS TO THE ROYAL BOTANIC SOCIETY'S GARDENS, REGENT'S PARK.

The following pupils having passed an examination in Elementary Botany, were recommended by Professor Bentley to Mr. Sowerby for free admission to the Royal Botanic Society's Gardens in the Regent's Park, and these have been kindly and liberally granted to them:—

Mr. T. H. Baldock
— E. Barnes
— W. Cook
— T. Fleetwood
— W. H. Giddings
— C. S. Green
Mr. T. H. Hall
— G. B. Pearson
— P. B. Perrot
— A. J. Roberts
— H. D. Simpson
— E. Street

These Orders admit the Students to the Gardens, upon ordinary days in the months of March, April, and August, from 9 A.M., till 1 P.M.; and in May, June, and July, from 7 A.M. Such admissions, therefore, give great opportunities to those who receive them to make themselves practically acquainted with plants.

PHARMACEUTICAL MEETING.

Wednesday, March 2rd, 1859.

MR. T. N. R. MORSON IN THE CHAIR.

The following

DONATIONS TO THE LIBRARY AND MUSEUM

were announced:—

Journal of the Society of Arts, from the Society.
Photographic Journal, from the Photographic Society.
Proceedings of the Linnean Society, from the Society.
Quarterly Journal of the Chemical Society, from the Society.
"*London Sewage, shall it be wasted, or economized?*" by C. F. Glassford, from the Author.
Specimen of cod liver oil cake, from Messrs. Newbery and Sons.

LINIMENTUM SAPONIS.

The following note, addressed to Dr. Redwood, from Mr. T. B. Groves, of Weymouth, was read in connexion with the minutes of the previous meeting:—

"I have lately made some experiments for the purpose of *identifying* the substance that causes the gelatinization of Linimentum Saponis.

"By pouring the gelatinized liniment on a calico strainer, and applying a graduated pressure, the *jelly* may be at last so consolidated as to bear the screw, and is then obtained as a hard and difficultly soluble soap, which, on examination, proves to have a basis of soda. By redissolving this soap in boiling alcohol, and pressing at *least* twice (*i.e.* in all three solutions), it is obtained in a state of purity. I then find that four grains of it are sufficient to completely gelatinize one ounce of rectified spirit, and that it is soluble in the same menstruum to the extent of only 1.4 grains in one ounce.

"To a solution of this soap in rectified spirit, I added a slight excess of diluted sulphuric acid, and, on the liquid cooling, the fatty acid was deposited beautifully white. The main point for identification was to ascertain its melting point, and

I found that the acid obtained from the soap twice dissolved, fused at 132°; that thrice dissolved at 140°, the exact point at which *margaric acid* fuses. That which has hitherto caused so much annoyance is, as has been conjectured, margarate of soda. I find by calculating the quantity of margarate of soda present in the proportion of hard olive oil soap, ordered in Linimentum Saponis, P.L., that this result is confirmed. Thus olive oil is said to contain of margarin 28 per cent.; Castile soap, of oil 60 per cent., which will give very nearly 4 grains of margarate of soda to each ounce of liniment—that proportion I have by experiment ascertained to be sufficient to cause complete gelatinization. I will just state in conclusion that I have for many years used in the preparation of soap liniment olive oil soft soap, and that I have found in my stock bottle crystals of carbonate of potash with soda, deposited by a reduction of temperature, as mentioned by Mr. Deane.

"I am strongly of opinion that the camphor and oil of rosemary are the really active ingredients in this preparation, the alcoholic solution of soap being the vehicle only—good or bad, according to circumstances. If hard soap and strong spirit be employed, it greatly increases the discomfort of friction; if soft soap and weak spirit, it becomes an excellent lubricant, and fulfils what I cannot suppose to be other than its intention. Mr. Deane has already indicated how these requirements can best be satisfied, by dissolving the soft soap and camphor in strong spirit, and allowing the mixture to settle, and be decanted from its excess of alkali before the proper amount of water is added.

"I intended to have stated that I have more than once met with specimens of hard soap that, when dissolved in rectified spirit, refuse to gelatinize, and I suspect they have been made from oil that had, by refrigeration, deposited a large proportion of its margarine."

ON A RED CANELLA BARK FROM THE WEST INDIES.

BY W. F. DANIELL, M.D.,
Hon. Member of the Pharmaceutical Society of Great Britain, &c.

During a recent sojourn in St. Jago de la Vega, Jamaica, I received, through the kindness of my friend Mr. March, specimens of a red bark of considerable pungency, obtained from a tree indigenous to the hilly districts in the neighbourhood of the town. The hot and peppery qualities of this cortical substance led me to infer that it belonged to a species of *Canella*. Mr. March, who is well acquainted with the botany of the island, had previously entertained a similar opinion, which was subsequently confirmed by the discovery of the plant which had furnished the bark. An examination of the botanical characters indicated its identity or close affinity with the *Canella alba*, Murray. Two varieties of this species dependent on the form of leaves are, however, known to exist in the mountain forests; one of these may probably be the *C. laurifolia* of Don. My friend suspected this cortex might have been taken from a *Cinnamodendron*, but in a letter he informs me that, having compared the red Canella with the latter, he found the wood and bark were "apparently quite distinct." The only doubt that remained relative to the identification of the plant proceeded merely from the flowers, which were not sufficiently perfect for investigation. The *Cinnamodendron* above alluded to, is no doubt the *C. corticosum*, Miers, lately described by Mr. Miers in an elaborate paper on the *Canellaceæ*. This author states that "its bark has the same aromatic properties as that of *Canella alba*, from which it is scarcely distinguishable, both being collected and exported under the same name," and he moreover observes that in the two species of *Cinnamodendron* known, the flowers are constantly axillary.*

* The following note has since been received by Mr. Bentley from Dr. Daniell:—
"I omitted to state in my paper on the Red Canella Bark, that the flowers of the tree which produced it were terminal, and were examined by Mr. March, but not with sufficient minuteness to determine their structure, as they were partially decayed."

Having frequently compared my specimens with the bark of living plants of *Canella alba*, which abundantly flourish in several of the Bahama Islands, I noticed they afforded many points of similarity. The warm aromatic properties, rugged epidermis, and peculiar double cortical layers were common to both, and with the exception of the red line, and perhaps a greater degree of pungency of the inner cortical layer of the former, no special differences could be detected.

It may therefore not be unreasonable to suppose that fragments of this kind of Canella were occasionally exported to Europe in former years, and led John Bauhin and subsequent writers to confound it with Winter's bark (*Drimys Winteri*, Forst.), under the term of *Cortex Winteranus spurius*.

As the evidence so far is decidedly in favour of this bark belonging to a species of *Canella* rather than *Cinnamodendron*, it has been proposed to provisionally designate this product (from the distinctive red colour) by the title of *Canella rubra*.

Professor Bentley said, that the paper just read had been forwarded to him for communication to the Society. Upon looking at the bark now described, he thought at first that it was the produce of *Cinnamodendron corticosum* of Miers, but, upon comparing it with specimens of that bark belonging to Mr. Daniel Hanbury, and which he had very kindly lent for exhibition this evening, he had little doubt of its being distinct. Mr. Bentley said that it was possible, however, that, notwithstanding the different appearances of the two barks, that they might be obtained from the same species of plant, as it was known that in the case of Cinchona barks especially, marked differences were observable in specimens taken from different sized branches, and from other causes. The question, therefore, could only be set at rest by the examination of specimens of the plant in flower, and he would request Dr. Daniell to obtain some at once. The botanical diagnosis of the two genera was a very simple one, as the species of *Cinnamodendron* had axillary flowers, whilst those of *Canella* were always terminal.

Messrs. Morson, Deane, and Squire thought the bark was distinct from the *Cinnamodendron*, as it had a more pungent taste.

Mr. Hanbury said that he had no doubt that the specimen now described was the produce of *Cinnamodendron corticosum*, and he believed that he had specimens of the latter which would exhibit the different states of transition to that of the present specimen.

ON OTTO OF ROSE.

BY DANIEL HANBURY, F.L.S.

The importance of authentic specimens is well understood by naturalists. The botanist who has had the opportunity of verifying the Linnean name of a plant by comparing it with Linnæus's own specimen, is sensible that no more satisfactory proof is wanting. The entomologist who can appeal to the specimens of Fabricius, or the zoologist who can point to those named by Cuvier as identical with his own, feels that he can rightfully adopt the names given by those authors. Nor is the student of Materia Medica much less in need of authentic or type specimens as standards of comparison. Yet how difficult it would be to point to a specimen of Sarsaparilla as indubitably the root of one particular species of *Smilax*, or to find in our museums a specimen of Myrrh or Olibanum, or Gamboge, with indisputable data as to its botanical origin and place of production.

These observations have been suggested by the difficulty which occurs to the druggist in the purchase of Otto of Rose. The wholesale price of the article

varies from 14*s.* to 26*s.* per ounce, a fact indicative of a wide range of qualities. But assuming that the most expensive article is the purest, it will be found to differ materially from the Otto described by our best authors. Pereira states* that at temperatures below 80° F., Attar of Roses is a crystalline solid; and the same assertion is made by Dr. Royle.† Brande states‡ that it melts at 84°; Redwood, that it fuses between 84° and 86°.§ Martiny gives 86° as its fusing point.‖ Chevallier, Richard, and Guillemin say that it is concrete below 84° to 86°.¶ Dr. Jackson states, of the Otto made at Ghazeepore, that it melts at 84°.**

Yet the Otto of the London market, as all druggists know, is never found with so high a fusing point, and in fact, there is but a portion of that which arrives, of which one could say that it is solid above 60° F.

These discrepant facts have long engaged my attention, and believing that the general subject of Otto of Rose merits the notice of pharmaceutists, I have placed on paper the observations which I have collected, and have now the honour of laying them before the Pharmaceutical Society.

For convenience I think it best to discuss the subject under three heads, namely, *Production*, *Adulteration*, and *Chemical Characters*. First, then, the

Production of Otto of Rose.

The Otto of Rose with which at the present day the English market is supplied, is produced in Turkey, on the plains lying south of the Balkan mountains.

Otto of Rose is also collected in Provence, in the South of France, by the distillers of Rose Water, and this Otto, the production of which is very limited, realizes a high price. In the state of Tunis, in Persia, and in the northern parts of India,†† Otto of Rose is also manufactured, but none from these countries finds its way into the London market.

With regard to Turkey, the chief localities in which the rose is cultivated for the production of Otto, are Kizanlik, a large town lying on the southern side of the Balkans, about seventy miles to the north of Adrianople. At Eski-Zaghra, in the valley of the Tunja, to the south-east of Kizanlik, the rose is also cultivated on a large scale, and at Carlova;‡‡ also on the southern side of the Balkans, and about 100 miles from Adrianople, much Otto is said to be produced.

The flowering season commences in May, and the roses are usually collected before sunrise every morning. When the weather is dry and hot, the flowering season is short, and the roses blooming about the same time, it is impossible to collect them all.

The process followed is the simple one of distilling the roses with water in copper stills of no very considerable dimensions, and collecting the Otto from the distilled product.

In very favourable seasons, the three districts above mentioned can produce from 300,000 to 360,000 *meticals*, which, at six *meticals* to the ounce, would give from 50,000 to 60,000 ounces. This, however, is of rare occurrence, as, independently of hot weather, other causes, as frost, or caterpillars, may reduce the crop.

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* *Elements of Mat. Med.* Ed. 3, vol. ii., p. 1812. † *Manual of Mat. Med.* Ed. 2, p. 432.
‡ *Manual of Chemistry.* Ed. 6, p. 1551. § *Supplement to the Pharm.* Ed. 3, p. 861.
‖ *Encyklop. d. Med.-Pharm. Nat.- und Rohwaarenk.* Bd. ii., p. 389.
¶ *Dict. des Drog.* T. iii., p. 158.
** O'Shaughnessy's *Bengal Dispensatory* (p. 328), in which work Dr. Jackson's interesting account is given at length.
†† Ghazeepore on the Ganges is famous for its manufacture of Rose Water and Otto of Rose. The latter I would willingly have examined, but have been unable to obtain a specimen, or, in fact, of any Indian Otto of Rose in a state of purity.
Tunisian Otto of Rose, valued at an enormous price, was sent to the Great Exhibition of 1851, but I had no opportunity of obtaining a sample.
‡‡ Sometimes spelt *Carloya*, but I cannot find it under either name, even upon the best maps.

I am informed that in the year 1854, the crop in the three districts above named, though not abundant, was calculated at 250,000 *meticals*, equal to 41,666 ounces; in the year 1855 it was estimated at 30,000 ounces; while in 1856 it did not much exceed 13,000 ounces.

The Otto of Rose is transported from the producing districts in large, flat, tin bottles, covered with thick, white felt, and bearing a calico label inscribed with Turkish character. By the dealers at Constantinople it is transferred to cut and gilt glass bottles imported from Germany, and in these it usually finds its way to the markets of Europe. Sometimes, however, the large tin bottles are imported into London, it being supposed (and with some reason) that the Otto they contain has escaped being tampered with at Constantinople.

According to the official returns prepared for the Board of Trade, the quantities of Otto of Rose imported into the United Kingdom upon which duty was paid, were, during four years, as under:—

1854	1251 lbs.,	equal to	20,016	ounces.
1855	1012 "	"	16,192	"
1856	1522 "	"	24,352	"
1857	1591 "	"	25,456	"

The duty is one shilling per pound.

Adulteration of Otto of Rose.

Although in Turkey the adulteration of Otto of Rose is sometimes practised by the producers, and especially of late years, since the repeal of a law in 1840 or 1841, prohibiting such adulteration under pain of death,* it is chiefly at Constantinople that this fraudulent practice takes place.

Among the substances which have been used for the adulteration of Otto of Rose, I may mention two as specially deserving attention. The first is Spermaceti, which, in Turkey, is, I am assured, frequently mixed with the cheaper qualities of Otto; the second, which is far more systematically and extensively employed, as well as more difficult of detection, is an essential oil, called in Turkish, *Idris Yaghi*.† It is not unfrequently imported into London from Turkey, and is then known in the London drug trade as *Turkish Essence of Geranium*.

Let us consider what is its origin. The *Catalogue of the Turkish Section of the Great Exhibition of* 1851 states that it is brought from Mecca. A sample presented by M. Della Sudda to the Ecole de Pharmacie of Paris, has likewise this origin assigned to it.‡ I am, moreover, informed by my friend Mr. Maltass, that the Idris Oil found at Smyrna is all brought by the pilgrims arriving from Mecca. M. Guibourt has stated to me upon the authority of a gentleman at Constantinople, that the dealers there affirm that the oil in question comes from India by way of Egypt.

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* I give this upon the authority of Mr. Edward Schnell, of Adrianople, to whom, through my friend Mr. Maltass, I am indebted for other particulars respecting the production of Otto of Rose in the Balkan.

† I have taken some pains to discover the signification of this name, but without much success. My friend Mr. Redhouse, thinks it is عضرس ياغى *Idris yaghi*, which may signify *Marsh-mallow Oil:* and as there is a word in Turkish (ابه كومجى *Ébé-gumèji*) which is used to denote both the Marsh-mallow and one of the common garden Geraniums, so it is possible that the Arabic عضرس *idris* may have the same double signification:—though the application of any term signifying *geranium* to the essential oil in question, is, as I shall show, only correct in so far as that there is a similarity of odour.

‡ *Journal de Pharm. et de Chimie.* Tome xxix., p. 310.

Although it is thus tolerably evident that the essential oil called *Idris Yaghi* is imported from Mecca, or perhaps from Jeddah, the port of Mecca, all that we know of these places tends to show that it is not produced there. Mecca appears to have no manufactures, but to be entirely supported by the pilgrims who flock to its holy places: besides which, the nature of the country and the climate, utterly forbid the idea of a green herb being produced in quantity for distillation.

Jeddah is also without manufactures, but it has a large trade with various ports on the Red Sea, as well as with India. Burckhardt, who visited it in 1814, has left a minute description of the various trades carried on, and even the number of persons engaged in each; and it is perfectly clear from his account, that even for the most trifling manufactured articles, Jeddah is dependent either on Egypt or India.*

From Bombay, on the other hand, an essential oil is exported, which is *undistinguishable* from the Turkish Essence of Geranium.† This liquid is known in India as *Roshé* or *Rosé* Oil,‡ and in the London market as *Oil of Ginger-Grass* or of *Geranium*. It is the produce of the more northern parts of India, where it is obtained by the distillation of certain grasses of the genus *Andropogon*, but the precise species of which I am at present unable from personal knowledge to name.

From the *Report on the External Commerce of Bombay*, for the year 1856-7, a valuable mass of statistics, compiled by R. Spooner, Esq., Reporter General, and published by authority of Government, I find that *Roshé* (or *Rosia*) *Oil* was exported from Bombay during the year in question to the extent of 1922 gallons. Of this enormous quantity, 541 gallons were shipped to England, and the remaining 1381 gallons to the Arabian Gulf. The *Report* does not state to what ports in the Arabian Gulf this quantity of Roshé Oil is shipped; but as none is reported as shipped to Aden or Suez (for which places, as for the United Kingdom or France, there are special returns), it is plain that it is shipped to other ports than these.

Now, although there are several other ports in the Arabian Gulf, it is Jeddah the port of Mecca that stands foremost in importance. To quote a competent authority:§—"From its position, it is the entrepôt of all goods coming from India and Egypt. The merchants of Cosseir, Yambo, Hodeyda, and Massowah draw their supplies from it." According to Burton, the value of the import trade of Jeddah with India amounts to about 25 *lacs* of rupees (£250,000) annually.‖

Coupling these facts with the testimony of the Turks, that the volatile oil called *Idris Yaghi* is imported from Mecca, and still more with M. Guibourt's information that it is brought from India, I think there is good circumstantial evidence for identifying it with the *Roshé Oil* that is imported from Bombay; and when we consider the immense influx of pilgrims every year to Jeddah, the transport of the drug northward to Egypt and Turkey is easily explained.

Although I have thus demonstrated (as I think) the identity of the Turkish *Idris Yaghi* with the *Roshé Oil* of Bombay, and therefore proved them the produce of one or more species of *Andropogon*, growing in India, it may be

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* *Travels in Arabia*, Lond. 1829, 4to, p. 41, &c.

† I must, however, admit that in English trade-lists the two are separately enumerated, the Turkish fetching a higher price.

‡ This orthography, Professor H. H. Wilson informs me, is the most correct, the word being Maráthí and written रोसे. (Vide Molesworth's *Maráthí and English Dictionary*, ed. 2, Bombay, 1857.) It is, however, often spelt *Rosa*, *Rosia*, *Rowsah* or *Roosa*.

§ R. Innes, Esq., of Cairo, quoted in Parkyn's *Life in Abyssinia*, vol. i. p. 402. *Pilgrimage to El-Medinah and Meccah*, vol. iii. p. 379.

proper that I should briefly state other reasons for considering that this volatile oil has no claim to the name often given to it of *Essence of Geranium*. I may say, then, that it differs from true essential Oil of Geranium, such as is distilled from a variety of *Pelargonium Radula* Ait. in the South of France.

1. In odour.
2. In optical properties in having (according to the observations of my friend Dr. De Vry) no rotatory power when examined by polarized light, whereas, French Oil of Geranium possesses the power of right-handed rotation.*
3. In chemical properties, inasmuch as when exposed to the vapour of iodine, it does not acquire the intense coloration that occurs when Oil of Geranium is so treated.
4. In commercial value, true Oil of Geranium being worth six times the price of *Idris Yaghi*, and ten times that of the Bombay Roshé Oil.

Before being mixed with Otto, the *Idris Yaghi* is subjected by the Turkish dealers to some purifying process, chiefly, it would seem, with a view to diminish its colour, a pale colour in Otto of Rose being deemed a sign of goodness.

Chemical Characters of Otto of Rose.

As I have already observed, there exists regarding the temperature at which Otto of Rose liquifies, great discrepancy between the statements of authors and the result of observations made upon the Otto of commerce.

Otto of Rose, it is well known, consists of two bodies, a liquid essential oil or elæoptene (upon which I have made no experiments) and a stearoptene. The stearoptene I find to be, when pure, a colourless crystallizable substance, devoid of odour and taste, fusing at 95° F., very slightly soluble in alcohol of sp. gr. .838 in the cold, but more soluble if heated. It is soluble in the liquid portion or elæoptene of Otto of Rose, but, according to its abundance, separates more or less readily with a depression of temperature. It dissolves readily in ether, chloroform, or olive oil, but not in solution of potash or ammonia.

These two bodies, the elæoptene and stearoptene, exist, according to my observations, in the Otto of different districts in very different proportions, and to their relative amounts I attribute much of the variation which I find in the specimens examined. The amount of stearoptene was determined in a series of parallel experiments, conducted simultaneously by treating a given weight of Otto with alcohol (sp. gr. .838), throwing the precipitated stearoptene upon a filter and thoroughly washing it with fresh alcohol; the same amount of alcohol being employed in each case. The stearoptene was then pressed for some days between paper, and after exposure to the air and drying over oil of vitriol, was weighed.† The fusing point was determined in each case by the same thermometer placed by the side of the bottle, and the observations were confirmed by repeated trials.

The English and French samples experimented upon, were obtained direct from the manufacturers, and mostly upon my personal application. The Turkish sample No. 7, was manufactured at Kizanlik, where Messrs. Herman, from whom I received it, have an establishment.

The results I have tabulated as under:—

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* But, as some essence of geranium from Algiers, examined by the same observer, was found to have the power of *left-handed* rotation to an almost equal extent, it is obviously *possible* that by mixing the two, an essence having *no* rotatory power might be produced—an improbable explanation, certainly, of the absence of rotatory power in the *Idris Yaghi*, but one which it is fair to mention.

† I am quite aware that this method of determining the amount of stearoptene is not free from objection, since, the more abundant the elæoptene, the less will the stearoptene (in which it is soluble) be precipitated when the otto is first treated with alcohol.

TABLE SHOWING THE RESULTS OF A COMPARATIVE EXAMINATION OF TWELVE SAMPLES OF OTTO OF ROSE.

No.	Place of Manufacture, and Manufacturer's Name.	Fusing Point.	Percentage of Stearoptene.	Other Characters.
	ENGLISH.			
1	London—Messrs. Allen and Hanburys.	91° F.	68.1	Of a pale straw colour, crystalline, odour weak and not remarkably fragrant.
2	London—Mr. Whipple, at Messrs. Barron and Co.'s.	87° F.	50.6	Resembles No. 1
	FRENCH.			
3	Paris—M. Chardin Hadancourt.	85.5° F.	60.8	A crystalline mass, of a pale green colour; odour weak but agreeable.
4	Grasse—M. Antoine Chiris.	74° F.	37.2	Of a straw colour; when congealed, forming a highly crystalline mass; odour very fragrant.
5	Grasse—M. Mero.	71° F.	41.9	Of a brownish-yellow; forming, when congealed, a transparent mass of platy crystals.
6	Cannes—MM. Herman Frères.	70° F.	35.0	Resembles No. 4.
	TURKISH.			
7	Kizanlik	65° F.	6.7	Colour very pale yellow: when congealed, it constitutes a confused mass of platy crystals; odour exceedingly fragrant.
8	? seal G. S. & Co.	63° F.	7.3	Colour very pale yellow; a mass of platy crystals when congealed.
9	?	62° F.	6.4	Resembles No. 8.
10	?	62° F.	6.6	The finest Otto of the London market. In its characters it resembles No. 8.
11	?	61° F.	4.6	Resembles No. 8.
12	? second quality.	56° F.	4.25	Wholesale price in London, in large quantities, 14*s.* per ounce.

This table shows that the fusing point of Otto of Rose, and the proportion of stearoptene vary greatly in different samples. But it will also be observed that there is a similarity in the Otto produced in each locality. Thus, that of the South of England and North of France (samples Nos. 1, 2, and 3) has a high fusing point (varying from 85° to 91°), and contains a large percentage (50 to 68) of stearoptene. The Otto of the South of France fuses between 70° and 74°, and affords from 35 to 41 per cent. of stearoptene. That of Turkey, if we may consider samples Nos. 8, 9, and 10 as equally genuine with No. 7 (Messrs. Herman's), fuses at from 65° to 62°, and affords from 7.3 to 6.4 per cent. of stearoptene.* Sample No. 11 may be regarded with some suspicion from its resemblance to No. 12—the latter being acknowledged of inferior quality.

Whether the differences that exist in the characters of the various kinds of Otto, are the result of climate or of the method of manufacture, or whether (especially in the case of the Turkish Otto) they are to be traced to a difference in the species of rose, are questions for determining which, I have at present no sufficient data.

* The test used in Turkey by the persons who purchase Otto from the producers, is to plunge a small vial of it into water at 10° Réaumur (= 55° F.). If, in the space of five minutes, the Otto congeals, it is regarded as genuine.

Mr. Squire inquired what difference existed between the several varieties fo otto in regard to odour.

Mr. Hanbury said the English otto was decidedly the most deficient in odour, and the French, although better than the English, was in his opinion inferior in fragrance to that imported from Turkey.

Mr. Pedler thought Mr. Hanbury had not sufficiently taken into account the difference in the modes of obtaining otto in this country and in those countries where it was made by a special process. English otto was obtained only as a very small secondary product in the distillation of rose water. In this process a considerable quantity of water was used, which dissolved nearly the whole of the more odorous part of the essential oil, and that which separated was principally the odorless stearoptene which was less soluble in water. The process adopted in Turkey was very different from this, and yielded nearly all the essential oil of the rose in the form, not of rose water, but of otto. He considered, however, that the otto imported from Turkey was not so good now as it was many years ago, when the price was much higher than at present.

The Chairman said some small quantities of otto, very superior to that usually met with in commerce, had been recently brought to this country from Turkey, but it was unsaleable at the high price demanded for it.

Dr. Redwood inquired of Mr. Hanbury whether he had compared English and Turkey otto which had been deprived of the stearoptene, and if so, whether he found any marked difference in the odour of the fluid portion, or elæoptene, obtained from these sources.

Mr. Hanbury said, that though he had not isolated the elæoptene of English and Turkey otto, yet he had ascertained sufficient to convince him that the odour of the Turkish was far superior to that of the English.

Mr. Bentley referred to a process, which had been described by Landerer as the process of dry distillation, which that author stated was adopted at Damascus. He wished to know whether Mr. Hanbury had obtained any information with regard to the adoption of that process. The consumption of otto in this and other countries was, he believed, greater than the quantity of genuine otto produced in Turkey, and hence adulteration had been resorted to in order to meet the demand. With regard to the difference observed in the quality of the otto of this, as compared with that of other countries, it was an interesting inquiry as to what was the cause of it. Was it climate, or soil, or the variety of the rose used? He should like to know what was the quality of Indian otto? China too was said to yield otto of rose, but he had never seen a sample of it, nor any description of its quality.

Mr. Hanbury had not obtained any information confirmatory of the statement of Landerer that dry distillation was adopted; in fact, this statement was, he believed, confirmed by no one. The process actually in use was that of distillation with water. He thought the difference of climate was insufficient to account for the superiority of Turkish otto. A difference in the species of rose was more likely to account for it. With regard to Indian otto, he had taken great pains in endeavouring to procure a sample for examination, especially of that manufactured at Ghazeepore, but had failed, and therefore could say nothing as to its quality. It had been stated in some books that otto of rose was made in China, but he doubted the correctness of the statement. He could not find that any one had ever seen Chinese otto, and he was disposed to regard it as a myth.

PHARMACEUTICAL MEETING, EDINBURGH.

The Third Scientific Meeting for the present Session was held on Friday evening, March 4, at nine o'clock, in the Hall, 51, George Street;

MR. JAMES ROBERTSON, PRESIDENT, IN THE CHAIR.

There was a very numerous attendance of Members and Associates, including

Messrs. Flockhart, Gardner, Brown, Raimes, Blanshard, Ainslie, Stephenson, Dr. Macadam, Mr. Gamgee, &c.

Mr. ROBERTSON, in a few prefatory remarks, alluded to the importance of the subject to be discussed in the papers of the evening, and thereupon successively requested Dr. Macadam and Mr. Gamgee to read their communications.

After which a short discussion took place, and a vote of thanks to Dr. Macadam and Mr. Gamgee was moved by the PRESIDENT, and seconded by Mr. GARDNER.

ON THE CHEMICAL COMPOSITION, USE, AND ACTION OF SHEEP-DIPPING MIXTURES;

With Special Reference to Experiments undertaken in connexion with the late wholesale Poisoning of Sheep at Burton, Northumberland.

PART I.—*The Chemistry*, by Dr. STEVENSON MACADAM, F.R.S.E., Lecturer on Chemistry in the Medical School, Surgeons' Hall, and School of Arts, Edinburgh.

PART II.—*The Physiology*, by Mr. JOHN GAMGEE, Professor of Veterinary Medicine and Surgery, New Veterinary College.

PART I.—BY DR. STEVENSON MACADAM.

THE communication which, jointly with Mr. Gamgee, I have engaged to bring before the notice of this society, owes its origin to certain proceedings which have recently been taken by a farmer against a chemist. The preliminary facts are, that early in August, 1858, a farmer called at the establishment of Mr. J. Elliot, chemist and druggist, Hide Hill, Berwick, stating that he wished to be supplied with baths to dip 700 sheep; and for this purpose he was recommended to purchase and employ fourteen packages of a certain mixture. The farmer then suggested that an extra package should be sent, as there might be a few more than the 700 sheep, and accordingly fifteen packages were forwarded to the farm. On each package certain directions for the use of the bath were affixed. The farmer dipped his sheep on a Saturday, and on Monday they commenced to die. In a few days, 850 out of the flock of 869 sheep were dead. Besides these, and about the same time, a donkey, an ox, five horses, and a number of fowls died suddenly, and these animals, it is scarcely necessary to mention, had not been dipped in the sheep-bath. Moreover, other farmers, in the immediate neighbourhood of the disaster, had dipped their sheep in the same kind of bath, at the same time, and though material, directions, and weather were similar, not a single casualty—not even sickness—occurred. And further, these farmers did not lose any oxen, horses, or fowls from any cause during that period.

Two theories were at once started to account for the death of the sheep. The first was, that the dip was too strong, and that the poison had been absorbed by the skin, and thereby caused the death of the sheep. The second theory was, that the animals had been hastily dipped, the wool had been imperfectly pressed, thereby leaving much liquid in the fleece; the animals were then sent to a grass-field; the poison dripped or was washed by rain, on to the grass; the sheep ate the grass, and were thereby poisoned. In the absence of direct experiment, either of the two theories might have been thought probable, or, at least, possible.

Whenever the chemist was told of the calamity which had befallen the flock of sheep, and was informed that one of the fifteen packages which he had supplied to dip the sheep still remained entire, he at once said that he never knew of the dip acting so before, and would not believe that the mixture could have been used according to directions; but he stated to the farmer that he was quite willing to purchase twenty-five sheep, and, at his own risk, dip them in the wash obtained by dissolving the remaining package, and whether the animals lived, or suffered, or died under the ordeal, that he, the chemist, would stand or fall by the result. The farmer refused to settle the point by experiment. He was told by scientific men that the arsenic had passed in by the skin, and poisoned the animals. He adhered to death by absorption, and repudiated the idea of any experiment to support or negative this view. This repugnance to experimental fact, as the jury to try the case, adhered to all the witnesses for the farmer, and beyond the search for arsenic in the carcase of one sheep, and the analysis of the bath or mixture, there was not a single experiment made by any of the witnesses for the farmer.

It was otherwise on the part of the chemist. He was anxious that mere opinion or theory, without the basement of experiment, should not rule the evidence on his side, and he was desirous of experiment. He could have remained satisfied by proving that his dip had been in use for fourteen years without a single casualty; that during the last ten years about 200,000 sheep had been dipped in his bath, and had been the better of it; that 20,000 sheep had this year been immersed in solutions of mixtures the very same as those from which the packages sent to the farmer had been selected, and no injury or loss had been sustained. The chemist had more than 200,000 witnesses as to the excellence of his bath against the 750 supposed to have been hurt by it—viz., 300 witnesses against 1; but still he offered to stand or fall by experiment. He states this offer was not accepted; but, notwithstanding that, he was desirous to know the right or wrong of the matter at all hazards. He resolved to try experiments for the sake of truth—to hazard all on his own side. In furtherance of this view, Mr. Gamgee and I were consulted, and the following experiments were instituted.

On the 4th of January, 1859, Mr. Gamgee purchased and handed over to me, for the purpose of being tested as to their commercial purity—

(I.) a package containing 10 lbs. arsenic;
(II.) " " 5 " soda ash; and
(III.) " " 1 lb. sulphur.

The arsenic was found to be entirely volatile, the vapours readily depositing in crystals on the cool sides of a test-tube. These crystals were entirely soluble in water, and the solution gave the three liquid tests for arsenic, viz.:—

Hydrochloric acid and hydrosulphuric acid, a *yellow precipitate*, soluble in ammonia.

Ammonio-nitrate of silver, a *yellow precipitate*.

Ammonio-sulphate of copper, a *green precipitate*.

The arsenic, likewise, when examined by the processes of Reinsch, Marsh, and Berzelius, readily yielded incrustations of metallic arsenic. Five grains by weight of the arsenious acid dissolved in water, treated with hydrochloric acid, and a stream of hydrosulphuric acid passed through the solution, yielded 6.19 grains of the ter-sulphuret of arsenic, or sulpharsenious acid. The soda ash was tested by the alkalimetry process, and was found to contain 32.18 per cent. of soda. It was soluble in water with the exception of a mere trace of insoluble matter.

The sulphur was in the sublimed form, was entirely volatilized when heated, burned into sulphurous acid when set fire to; was oxidized by concentrated nitric acid into sulphuric acid, and when acted on by liquid ammonia, and the ammoniacal solution treated with hydrochloric acid, there was no precipitate of sulphuret of arsenic.

It was therefore apparent that the arsenic, soda ash, and sublimed sulphur were commercially pure, and, accordingly, they were reported by me as such, and handed back to Mr. Gamgee for the purpose of being used in his experiments.

As introductory to the consideration of composition and strength of the various dips employed by Mr. Gamgee and myself, I may state that baths for sheep, containing arsenic, are used by farmers to a much larger extent than any other kind of bath, and that the efficacy of such a bath, in destroying the vermin on the sheep, depends mainly on the arsenic which is present therein. In Mr. Elliot's dipping mixture the arsenic is associated with soda ash and sulphur; to which soft soap is afterwards added. The soda ash is employed for the purpose of rendering the arsenic much more soluble than it would otherwise be, which it does by combining with the arsenic and forming the soluble arsenite of soda. The sulphur combines, with a part of the arsenic and soda, to form sulphurets, which aid in the destruction of the vermin and afterwards assist in keeping off the attacks of the fly. The soft soap is intended to cleanse the wool of the sheep. Other well-known sheep-dipping mixtures are composed of similar ingredients, and several of these I examined years ago, and have lately repeated the analysis of them. Potash is often used to dissolve the arsenic in place of the soda ash, but the principle of the action is the same.

The proportions of the ingredients stated by Mr. Elliot to compose his bath are—

20 ounces arsenic
20 " soda ash
2 " sulphur

These ingredients are placed in a mortar, mechanically mixed therein, and then enclosed in a double paper wrapper having the following directions as to making up the bath affixed thereon:—

"Pour upon each packet 3 or 4 gallons of boiling water, and stir well for the space of ten minutes; add about 45 gallons of cold water, and dissolve in the mixture 4 lbs. soft soap; the preparation will then be completed, and the quantity sufficient to dip 50 hogs."

The amount of arsenic, therefore, admitted by Mr. Elliot to be present in each of the packages was 20 ounces, and this quantity was considered sufficient to dip, and was intended to be used in the dipping, of 50 hogs. In other words, when each hog was dipped in the 50-gallon arsenical bath, and thereafter the wool strained sufficiently, it was considered likely that it would carry away with the water which still soaked the fleece, on the average, one fiftieth of the whole contents of the bath, viz. one gallon, including the arsenic, soda, sulphur, and soap dissolved therein. The same liberal supply of liquid is admitted by all vendors of baths, and all professional sheep-dippers, to be the amount generally taken up and retained by the fleece. The quantity of arsenical solution thus allowed for each animal is doubtless considerable, but I am anxious that it be observed at once, that the amount of poisonous ingredient supplied by Elliot's bath, so far from being greater than that usually administered to one or a number of sheep, is, in fact, so much less that it is only one-half the strength of the best known and most successful sheep-dipping mixtures employed in Great Britain. In corroboration of this statement I have now to contrast the arsenical strength of Elliot's dip with that characteristic of two of the most famous dips vended in this country, and which, on account of their very extensive use, with acknowledged safety to the animals immersed therein, have been selected as those best entitled to be considered *standard* baths for sheep. Dip X was bought by me, personally, at the establishment of the recognized agent of the manufacturer of the article. On analysis, by myself, it was found to contain arsenic, potash, sulphur, and an oil forming soap with the potash. Printed directions regarding the manner of using the dip accompany each purchase, and, following these directions, any one can observe the total weight of arsenic supplied for a given number of sheep. As it is immaterial what number are intended to be operated upon so long as the stated proportion of dipping ingredients is adhered to, I will, for the sake of more ready comparison, give the amount of arsenic supplied for 50 sheep (that being the number over which one of Elliot's baths is intended to be distributed), and afterwards the proportion allowed for each sheep, and supposed to be carried off by it. Now, in Dip X, the quantity of arsenic vended for 50 sheep, as determined by analysis, is 38.24 ($38\frac{1}{4}$) ounces, and for one sheep, 334.6 ($334\frac{1}{2}$) grains. Dip Z was purchased by my assistant from the recognized agent of the inventor of the mixture, and was delivered into my hands with the seal of the manufacturer unbroken. On examination, it was found to contain arsenic and potash, and the instructions accompanying each package were that 4 lbs. of soft soap should be added to the quantity required for 50 hogs. The amount of arsenic in Dip Z, and intended to be diffused over 50 sheep, I found on analysis to be 38.50 ($38\frac{1}{2}$) ounces, and for one sheep, 336.7 (337) grains. Now, the quantity of arsenic at once admitted by Mr. Elliot to be in his packages intended for 50 sheep was 20 ounces, but as the chemist's statement in this matter may be strengthened by an analysis of his baths, I made an examination of an authenticated package received from the hands of Mr. Gamgee, and which was one of the ordinary baths supplied by the chemist. The package weighed 44 ounces, and contained 20.08 ounces of arsenic, demonstrating as near an approximation to accuracy in the weighing of the materials by the chemist's assistant as could be desired. It follows, therefore, that, by analysis, Elliot's bath supplies only 20.08 (20) ounces of arsenic for 50 sheep, or 175.9 (176) grains for each hog.

The importance of the foregoing experimental results as to the proportions of arsenic contained in the two standard sheep-dipping mixtures, as contrasted with Mr. Elliot's, will be more apparent when presented in a tabular form, as follows:—

	Elliot's Dip.	Dip X	Dip Z
Ounces of arsenic supplied in each sheep-dipping mixture for 50 sheep	20	$38\frac{1}{4}$	$38\frac{1}{2}$
Grains of arsenic carried off on the fleece of each sheep	176	$334\frac{1}{2}$	337

It will therefore be apparent that Elliot's bath is only half the arsenical strength of Dips X and Z ; and, accordingly, if the supposition be correct that Elliot's mixture is a dangerous one, and can never be used without great risk of occasionally poisoning an entire flock of sheep which have been immersed in it, this statement ought to fall with at least redoubled force on the Dips X and Z, both of which have as yet been used with impunity in every sheep farming district in the United Kingdom.

The very large number of sheep which have been dipped in Elliot's bath during the fourteen years, and the habitual employment by many farmers of a bath containing double the amount of arsenic, might of themselves have been considered the best of all evidence, viz. that of constant and safe practice. The defender was, however, anxious to strengthen his position by requesting a practical investigation to be made by third parties. Accordingly, the following experiments were instituted by Mr. Gamgee, and I was entrusted with the chemical surveillance of the commercial purity of the ingredients employed, the testing of the baths, and other matters falling within the province of the chemist.

Experiment I.—The ingredients employed in this operation were the same as those used in Elliot's bath, and they were mixed in the same proportion, viz.:—

Arsenic	20 ounces
Soda Ash	20 ounces
Sulphur	2 ounces
Soft Soap	4 lbs.

These substances were agitated together with a few gallons of hot water, and after apparent solution, cold water was added to make up the volume of liquid to 35 gallons. This dip was stronger than that of Elliot's, on account of the smaller quantity of water used in dilution. The ordinary volume of water is 50 gallons, but 35 gallons were only employed in this instance, and hence the material which, in ordinary practice, is diffused over 50 gallons, and carried off on the fleece of 50 sheep, was, in this experiment, dissolved and mixed with only 35 gallons of water, and would, therefore, be spread over only 35 sheep. Mr. Gamgee made up this mixture, dipped several sheep in it, and then filled a quart bottle with the solution, and handed it over to me for examination. The quantity of arsenic supplied to the sheep in this bath, calculated from the amount used in preparing the dip, and which was either dissolved or suspended therein, was 250 grains of arsenic to each sheep, or in the proportion of 28.57 ($28\frac{1}{2}$) ounces to 50 sheep. In examining the liquid taken from the bath, and handed over to me by Mr. Gamgee, I was anxious that only that portion of the arsenic which had been dissolved should be estimated; and, accordingly, the bottle was allowed to remain at rest for some time, and a measured quantity of the liquid decanted, and the arsenic dissolved therein precipitated and weighed. The liquid was found to contain 199.2 ($199\frac{1}{4}$) grains of arsenic in the gallon, being likewise the amount carried off by each sheep, in a soluble condition, on its fleece, and this amount, if calculated into 50 gallons, gives 22.76 ($22\frac{3}{4}$) ounces of arsenic for the 50 sheep.

Experiment II. was conducted with one of Elliot's packages and 4 lbs. of soft soap, dissolved in 35 gallons of water, but otherwise according to directions. Several sheep were immersed therein, excepting the head, and were then subjected to Elliot's bath, with the strength of 250 grains of arsenic dissolved and suspended for each sheep, or in the proportion of 28.57 ($28\frac{1}{2}$) ounces of arsenic to 50 sheep. A sample of the liquid selected by Mr. Gamgee, and placed in my hands, showed the presence of dissolved arsenic to the extent of 161.6 ($161\frac{1}{2}$) grains to the gallon, and single sheep; and 18.47 ($18\frac{1}{2}$) ounces to the 50 gallons, or 50 sheep.

Experiment III. was made with

Arsenic	48 ounces
Soda ash	48 ounces
Sulphur	4 ounces
Soft soap	4 lbs.

These materials were treated with hot and cold water so as to make up 35 gallons, and supplied a bath which contained 600 grains of arsenic in each gallon and for each sheep, or no less than in the proportion of 68.57 ($68\frac{1}{2}$) ounces of arsenic dissolved and suspended in 50 gallons of liquid, the quantity of water generally allowed for 50 sheep. The animals immersed in this bath by Mr. Gamgee were thus subjected to more than three times the amount of arsenic than that they would obtain in

Elliot's bath, used acccording to directions. The liquid taken from the bath was found by me to contain 331.20 (331$\frac{1}{4}$) grains of arsenic dissolved in each gallon, or 37.86 (37$\frac{7}{8}$) ounces in 50 gallons. Each sheep would thus carry away on its fleece 331$\frac{1}{4}$ grains of dissolved arsenic, and 600 grains of arsenic dissolved and mechanically suspended in the liquid which saturated the fleece.

Experiment IV. is referred to fully in Mr. Gamgee's paper, and does not call for notice here, as the liquid was not examined by me.

Experiment V. was conducted by Mr. Gamgee and myself. The proportions of the ingredients employed were—

Arsenic	24 ounces
Soda ash	8 ounces
Sulphur	2 ounces
Soft soap	4 lbs.

These materials were placed in a large tub, four or five gallons of hot water added, and the whole well stirred for at least ten minutes, and thereafter hot and cold water till the bath measured 35 gallons, and the temperature was about blood heat. Into this dip, we introduced a sheep previously marked by me, and allowed it to remain there for five minutes. During that period we were constantly rubbing the solution into the wool, and skin of the animal, and, thereafter on taking the sheep out of the bath, it was handed over to a shepherd accustomed to dipping sheep, and he pressed the excess of liquid out of the fleece in the ordinary way. A second sheep, also marked by me, was introduced into the bath for half an hour, and similarly treated whilst immersed therein. A third sheep was placed in the dip for half an hour, and a fourth sheep for five minutes. All of these animals were dipped early on a Monday morning, on the Tuesday afternoon, about thirty hours after the immersion, I saw the sheep, all of which appeared healthy and well. At the same time, we collected the urine from the two sheep I had marked, and on examination by Reinsch's process, the urine was found entirely free from the presence of the slightest trace of arsenic. This test was a very severe one, for it demonstrated that when sheep are immersed in arsenical baths, arsenic is not absorbed into the system in quantity large enough to be recognized in the urine where it undoubtedly would be found if in the system at all, and where it might readily be present without the animal evincing or suffering from the effects of arsenical poisoning. I saw the sheep again on the Friday of the same week they were dipped, four days and six hours after they had been subjected to the arsenical treatment, being the afternoon immediately preceding the first day of the trial at Newcastle, and the animals were then in perfect condition and suffering from no ailment, disease, or sickness. The amount of arsenic to which these animals were subjected was considerable. In every gallon of the dip, there were dissolved and suspended 300 grains, which is the amount most likely carried off by each sheep on its fleece, as the bath was kept in agitation during the immersion by the struggles of the animals, and this calculated into a 50-gallon bath, gives the large amount of 34.3 (34$\frac{1}{4}$) ounces for fifty sheep. The quantity of arsenic actually dissolved in the liquid of the bath was much less, however, being only 181.60 (181$\frac{1}{2}$) grains for each gallon and sheep, and 20.75 (20$\frac{3}{4}$) ounces for 50 gallons and sheep. In the 35-gallon bath used in Experiment V, there were added 20 ounces of arsenic, but notwithstanding every possible endeavour to dissolve this amount of arsenic in the water with the assistance of 10 ounces of soda ash, it was found that only 14.53 (14$\frac{1}{2}$) ounces were truly and strictly dissolved therein, and 9.47 (9$\frac{1}{2}$) ounces remained undissolved, or in mechanical suspension. This experiment at once demonstrates the great use of a liberal supply of soda ash, assisting as it does in the solution of the arsenic by combining with it to form the much more soluble arsenite of soda. The large amount of arsenic undissolved would, from its great weight, have a tendency to fall to the bottom of the tub; but this descent of the particles would be retarded by the somewhat viscid nature of the liquid, occasioned by the large quantity of soap contained therein, and which would materially aid in keeping the undissolved arsenic in mechanical suspension.

Whilst these experiments were being conducted near Edinburgh, other trials were being made in England. Mr. Finlay Dun dipped a number of sheep in one of Elliot's baths full strength, and no harm occurred to any animals immersed therein. He then dissolved one of Elliot's packages in half the usual quantity of water, viz.

25 gallons, and thus obtained a liquid containing 351.8 (352) grains of arsenic in each gallon, and for each sheep immersed therein, and no casualty resulted. Lastly, he treated one of Elliot's baths with only 12½ gallons of water, one-fourth the usual quantity, and dipped several sheep in this strong bath, containing 703.6 (703½) grains of arsenic to the gallon, and not the faintest symptom of arsenical poisoning was exhibited by any of the animals so soaked in this bath, which was four times the strength of that recommended by Elliot. In the second trial made by Mr. Dun, the amount of arsenic calculated into 50 gallons and sheep was 40 ounces, and in the third series of experiments, 80 ounces. Again, Mr. Browning, a professional sheep-dipper, who passes many thousand sheep through his hands every year, and never loses one by death, stated at the trial that the quantity of arsenic he always employs is 5lbs. to the 100 sheep, which gives 40 ounces of arsenic to the 50 gallons or sheep, and 351.8 (352) grains to a single gallon and sheep. And Mr Calder, of Yetholm Mains, also mentioned that he used 16 ounces of arsenic for twenty sheep, which is the same proportion as that used by Mr. Browning, and he never knew of any casualty occurring to his sheep.

It will therefore be apparent that very much stronger dips have been employed in special experimenting and in practical sheep-dipping, than that sold by Mr. Elliot, and that in not a single instance, save that of the unfortunate 850 sheep, was any casualty or death ascribed or traceable to the arsenic of the bath ; at the same time, it is well known that to admit the arsenical dip in any quantity into the mouth or ears of a sheep is almost certain death. In order that the arsenical strength of the various baths alluded to in this paper may be more readily compared, a table is subjoined, which includes the more important points connected with each dip, and gives the proportions of arsenic supplied to fifty sheep in ounces, and to each sheep in grains.

	Ounces of arsenic present in fifty gallons of the bath, and intended to be taken up by fifty sheep.	Grains of arsenic present in one gallon of the bath, and taken up by one sheep.	Comparative amount of arsenic present in each bath, Elliot's being taken as 1.00 or 1.
Elliot's bath as directed to be used .	20.00 or 20	175.9 or 176	1
Gamgee and Macadam's Experiment I.	28.57 or 28½	250	1.43 or 1½
" " " II.	28.57 or 28½	250	1.43 or 1½
" " " III.	68.57 or 68½	600	3.43 or 3½
" " " IV.	11.43 or 11½	100	0.57 or ½
" " " V.	34.28 or 34¼	300	1.71 or 1¾
Finlay Dun's Exper. I. with Elliot's bath	20	175.9 or 176	1
" " II. "	40	351.8 or 352	2
" " III. "	80	703.6 or 703½	4
Browning's dipping mixture . .	40	351.8 or 352	2
Calder's dipping mixture . . .	40	351.8 or 352	2
Dip X, very extensively used in Britain	38.24 or 38¼	334.6 or 334½	1.91 or 2
Dip Z, " "	38.50 or 38½	336.7 or 337	1.92 or 2
Elliot's bath, as used at Burton, where 60 gallons of water were added to each package instead of 50, and, we presume, 60 sheep dipped therein . .	16.66 or 16½	145.8 or 145¾	0.83 or ¾

A glance at the above table will at once show that Elliot's dip, as directed to be used, which has been lately characterized as a dangerous mixture, and liable to be capricious in its action, is not stronger than the baths used in the experiments, which were conducted with perfect safety to the sheep engaged therein, and moreover, is much less strong than the majority of the baths employed, which in one instance was 4 times the strength of Elliot's, and in another trial 3½ times. Again, it was repeatedly mentioned at the trial, that the shepherd used 60 gallons instead of 50 for each package of bath mixture. This dilution will still further reduce the strength

of the dip as used at Burton, and, as stated on the table, would diminish the proportion of arsenic to 16.66 ($16\frac{1}{2}$) ounces for the fifty gallons and sheep, and 145.8 ($145\frac{3}{4}$) grains for each gallon and sheep; whilst the relative strength of the dip, as compared with the other solutions used, will be reduced to 0.83, or about three-fourths of the standard (Elliot's). Still further, the last package of Elliot's powder was treated with 100 gallons instead of 50, and in this a number of sheep were immersed, and the majority died; and yet the quantity of arsenic was only one-half that of the moderate amount supplied by Mr. Elliot; the proportion of arsenic for 50 gallons and sheep being only 10 ounces, and for each gallon and sheep, 88 grains.

The preceding experiments were conducted with the sole object of enabling the scientific witnesses on the part of the defender to speak from practical experience and special experiment. The doctrine of the absorbability of arsenic by the skin of the sheep from immersion in ordinary arsenical baths, in quantity to be recognized in the urine, or to cause sickness or death, was demonstrated by experiment to be untenable. That the death of the sheep at Burton was due to arsenic finding its way into the system by absorption from the skin, was therefore negatived; and the more so, that Dr. Douglas Maclagan, of Edinburgh, found arsenic in a soluble condition in the stomach and intestines of one of the 850 sheep; as also in the grass and soil of the fields in which they grazed, whilst he could not detect the slightest trace of arsenic in the grass or soil of the field immediately adjoining. The grass, therefore, which the animals eat before they were affected with the symptoms of arsenical poisoning, was contaminated with the deadly agent in a soluble condition; and the question is, Whence came the arsenic? The only answer is, that it came from the fleece of the sheep, which had been allowed to retain an over-dose of the arsenical solution, and which was assisted in its transit from the wool on to the fields by the shower of rain which fell on the evening of the dipping, and which, running over and off the fleece, poisoned the grass. It was declared by witnesses—scientific and non-scientific—at the trial, that sheep would not eat grass so poisoned by arsenical soap; but this supposition was entirely disproved by Mr. Gamgee, Mr. Wilkinson, and myself, who conducted a special experiment to determine the point. The mixture used in this experiment was the same strength as Elliot's, and the materials were purchased at Newcastle, and tested as to their commercial purity by myself. I was also present, and assisted in conducting the experiment, which is detailed in Part II. of this paper, and on the succeeding day saw the sheep eat the poisoned grass and oats. Another suggestion brought forward on the part of the farmer was, that the proportion of soda in Elliot's bath was too great, and this soda, from its caustic properties, would excoriate the skin, and thus more readily admit the arsenic to the system. Now, even admitting the possibility of the suggestion being brought forward, that the whole of the soda was caustic, it does appear to me that 20 ounces of soda in 50 gallons of water, viz. one ounce of soda in two gallons and a half, would hardly render the water so caustic as to produce excoriation, &c. But 20 ounces of caustic soda cannot be said to be present. The material employed is soda ash, a mixture of caustic soda, carbonate of soda, and some inert matters; and the amount of soda contained therein, both as caustic and carbonate of soda, ranges, in my experience as an analyst, from 25 to 50 per cent. The soda ash employed by Mr. Gamgee and myself in the earlier experiments contained 32.18 ($32\frac{1}{4}$) per cent. of soda, the sample used in the dipping at Newcastle had 32.8 (33) per cent. of soda, and the strength of the material employed by Elliot in compounding his packages, and determined by me in an authenticated sample, was 41 per cent. Hence in 100 parts of the soda ash used in compounding Elliot's baths, there were 41 parts of soda, existing as caustic and carbonate of soda. Now, the proportion in which arsenic combines with soda is as 99—the equivalent of arsenic (arsenious acid)—to 31 of soda. Hence, taking 100 parts by weight of arsenic, and adding these to 100 parts of the soda ash used by Elliot, and which contains 41 of soda, you would find, on the addition of water, that 99 out of the 100 of arsenic would unite with 31 of the 41 of soda to form the soluble arsenite of soda, in which the caustic nature of the soda is neutralized, leaving only 10 parts of soda out of the 41 contained in the 100 of soda ash unaccounted for. In other words, 100 ounces of arsenic added to 100 ounces of soda ash will so act thereon as only to leave 10 ounces in a condition at all likely to be declared caustic. These proportions, calculated to 20 ounces of soda ash, the amount present in every package of Elliot, intended for 50 sheep, would give 2 ounces of soda not required by the arsenic and not taken up by it. But even these 2 ounces

must not be pronounced to be caustic soda. The soda ash contains both caustic and carbonate of soda; and, when the arsenic is added to it, there is little doubt that the arsenic will seize hold of the free or caustic soda before it begins to decompose the carbonate of soda, evolving carbonic acid; at least this is the order in which other acids act, as evidenced in the testing of the soda ash by the alkalimetry process, where the addition of the first portions of sulphuric acid causes no effervescence of carbonic acid, and it is only when the truly caustic soda has combined with the sulphuric acid that the latter begins to act on the carbonate of soda, evolving carbonic acid with effervescence. It follows, therefore, that the 2 ounces of soda in each package of Elliot's mixture not taken up by the arsenic is present in the condition of carbonate of soda (that is, as common washing soda); and it is surely carrying the caustic properties of washing soda too far to declare, or even hint, that 2 ounces of soda, in the chemical form of washing soda, dissolved in 50 gallons of water, will form a liquid in which, if a sheep be dipped, the soda will act as a caustic, and produce excoriation of the skin. It may be stated, however, that the alkali present in the 4 lbs. of soap added to the 50 gallons of water has been forgotten. But even adding the whole of the alkali, viz. about 3 ounces of potash, to the 2 ounces of soda, it would only give 5 ounces of soda and potash in the 50-gallon bath, or 1 ounce in 10 gallons. Moreover, the skin of the human hand is surely as liable to be influenced by the caustic nature of the liquid as the skin of the sheep; and I can testify from experience that an immersion of my own hands for a quarter of an hour in a bath, fully as caustic as that recommended by Elliot, during which I was rubbing the liquid with the wool of the sheep, did not cause the slightest injury to my hands. Mr. Gamgee can testify to a much more lengthened immersion of his own hands with impunity, plainly showing by theory and practice that the arsenical bath supplied by Elliot does not yield a caustic solution, which, from its causticity, would injure the skin of a sheep immersed in it for less than a minute. Even though the liquid had been caustic to a considerable degree, I question much if it would act otherwise in the dipping of sheep than simply to combine with oily matters which are naturally exuded by the pores of the skin, and lodge in the wool, and thus form a soap. Probably the best of all evidence on the question of the causticity of Elliot's dip causing excoriation of the skin, is found in the facts, (1) that one of the scientific witnesses for the defence placed a plaster made of Elliot's dip, moistened with water, on his arm, allowed it to remain there for six hours, and did not suffer thereby; and (2) that as many of the skins as could be taken off the 850 sheep, before decomposition had set in, were sold at a fair price for healthy sheep skins.

An attempt was made during the trial to shake confidence in the uniform composition of Elliot's bath, by assuming that *damp* arsenic, or *adulterated* arsenic, was more poisonous or capricious, with a tendency to be more deadly, than ordinary dry and pure arsenic. It need hardly be said that *damp* arsenic, which Mr. Elliot, no doubt, possessed in a cask in his premises, but which it was proved he did not use in the compounding of these packages, will only differ from ordinary dry arsenic in being less *strong* or *deadly*, according to the proportion of water which it contains. And, *adulterated* arsenic, which was suggested, because Elliot could not state in evidence that he had tested his stock, and found it free from stucco or plaster of Paris, need not here be gravely declared *not stronger*, or *more poisonous*, but *less strong* and *less deadly* than pure arsenic, in the proportion that the harmless stucco is admixed. Moreover, every analysis of a whole package of Elliot's bath demonstrated that each did contain the right amount of arsenic. The only variation was in the case of a *portion* of a package from which a few grains were taken, and which yielded a slight *decrease* in the amount of arsenic; but the substance analyzed was not a fair specimen of an *entire* package; and it was not even dried before examination.

In conclusion, I may state that the preceding experiments and observations have been made with the sole object of determining whether the arsenical bath supplied by Elliot, and used according to direction, could be deadly to sheep immersed therein, leaving out the head; and I am compelled to believe, and give expression to the belief, that Elliot's mixture was and is a *reasonably fit, safe, and proper* bath for the dipping of sheep, when used according to the directions affixed to each package.

[*Part* II., *by Mr. Gamgee, will be inserted next month.*]

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

The Ninth Meeting of the Session was held in the Royal Institution, March 3, 1859;

MR. H. S. EVANS IN THE CHAIR.

The Secretary announced donations of Sumach, Red Argols., Ext. Catechu, and Stannate of Soda, from Mr. A. Redford.

The President informed the Meeting of the proceedings of the Council in reference to the Sale of Poisons Bill, and read the memorial which had been forwarded to Mr. Secretary Walpole; a Petition of a corresponding character had also been sent to the House of Commons.

The Memorial is as follows:—

"*To the Right Honourable* SPENCER HORATIO WALPOLE, *one of her Majesty's Principal Secretaries of State.*

"The Memorial of the Council of the Liverpool Chemists' Association,

"Humbly Showeth,

"That your Memorialists having carefully considered the provisions of the Sale of Poisons Bill, while recognizing the wish of the Government to make it as acceptable as possible to those affected by it, beg respectfully to lay before you, in accordance with the instructions of a General Meeting of their Members, the following amendments, which they consider would render it less objectionable, and more practicable, than it is at present.

"With reference to Clause 5, they submit that instead of the words 'full age,' the necessities of the case require the substitution of the words 'not less than sixteen years of age,' in the case of witnesses and purchasers.

"With reference to Clause 6, they think that the *signatures of the purchasers* of Opium and its preparations, and of Oxalic Acid, should not be required; and that the registration of the sale by the vendor should also be deemed sufficient when he knows that the poison is wanted for use in any art or manufacture. If this is not conceded, they think it essential that the articles (Opium and its Tincture, and Oxalic Acid) should be omitted from the Schedule, for if retained, the law, they consider, would be inoperative.

"With respect to Clause 12, they think that the penalties should in no case exceed £10, and should be subject to mitigation at the discretion of the magistrates. They do not wish to palliate wilful breaches of the law, but, considering that the failure to put on, or the neglect to replace, a label, by principal or assistant, incurs a penalty, they think that the fines named in the bill would be very oppressive.

"Your Memorialists venture respectfully to add the expression of their opinion that the thorough education of the vendors of drugs is the only real protection to the public against accidents from poison.

"And your Memorialists will ever pray, &c. &c.

"Signed on behalf of the Council of the Liverpool Chemists' Association,

"Henry Sugden Evans, *President*

"John Shaw, *Secretary*."

Mr. J. H. Ellerbeck then read the paper of the evening,

ON THE MANUFACTURE AND COMPOSITION OF GLASS.

After a brief, but comprehensive, history of glass, from the earliest records down to the present time, he first noticed the nature and properties of glass, and enumerated the ingredients which enter into its composition, and the circumstances under which some of the accidentally contained silicates are injurious.

He next referred to the different varieties of glass, and described each separately; viz., bottle, crown, plate, and flint, and entered minutely into an examination of the various formulæ at present in use. A description of the utensils employed by the glass and bottle-makers was given, also the process of cutting and polishing the large sheets of glass which are now in such extensive demand.

The manufacture of coloured glass, and the various metallic compounds used were particularized, gold being used for producing the ruby tints, silver and antimony for yellow, copper and chromium for red and green, cobalt for blue, &c. &c.

The paper concluded with a few observations on spun glass, and etching by means of hydrofluoric acid.

The PRESIDENT complimented Mr. Ellerbeck on the ability which he had displayed in the paper which they had just heard, especially as emanating from one of the younger Members of the Association, and he hoped that other students would follow in the same path.

Royal Institution.

THE Tenth Meeting was held on March 17th;

DR. EDWARDS IN THE CHAIR.

The SECRETARY announced donations to the Museum of two specimens of artificial ilvaite, or slag, from the copper-smelting furnaces of Messrs. Newton, Keates, and Co., from John Keates, Esq.; and some galls taken from an oak in Devonshire, from Joseph Guyton, Esq.

Dr. EDWARDS (the Chairman), when in London, having been deputed by the Council of the Association to wait upon W. Brown, Esq., the Member for the county, and T. B. Horsfall and J. C. Ewart, Esqs., Members for the borough, and endeavour to make them fully acquainted with the provisions of the Poisons Bill, and with the amendments desired by this Council, stated the result of his interviews.

Mr. ABRAHAM then read the paper of the evening, on

PHARMACY IN ITS RELATION TO THE PRACTICE OF MEDICINE.

I ANNOUNCED this paper because I thought that a consideration of the past and present state of Pharmacy, as affected by the progress of medical science, would be of interest to us.

Our duties as pharmists are closely connected with medical doctrines; they have undergone great changes, and will undergo further modification.

Let any one examine one of the old dispensatories, and he will soon see how different must have been the work of an apothecary of the era of Culpepper and Quincy from that which the pharmist of the present day has to perform.

The earliest Pharmacopœia in our library is that of Culpepper, dated 1667.

Culpepper's Pharmacopœia includes:—Earthworms, grasshoppers, millipedes, scorpions, the brain of sparrows and of the hare, the head of a coal-black cat burnt to ashes in a new pot, the head of a young kite burnt to ashes, crabs' eyes, the lungs of a fox, the liver of a duck, the liver of a frog, cocks' stones, sheep and goats' bladders, a flead mouse dried and beaten to powder, the skull of a man never buried, bear's grease, the skull of a man killed by violence, the excrement of thirteen different animals, the liver of the hedgehog, the hearts of frogs and larks, and much more equally foreign to laboratories of the present day.

The complexity of the composition and preparation of the medicines of that time was great and wasteful. If fox lungs are to be prepared, they must first be washed in white wine in which hysop and scabious have been boiled. Scammony is to be prepared by taking out the core of a quince, filling the void with powder of scammony, joining the quince, wrapping it in paste, and baking it in an oven.

The apothecary had to prepare spirit of earthworms, containing nineteen other articles. Of this Culpepper has the good sense to say, "'Tis a mess altogether; it may be that they intended it for an universal medicine." Many of the preparations, however, are far more complex than this.

In our own office we represent the old apothecaries, and I think it a pity that we have not retained the *name*, particularly as it does not seem to be wanted by any one else. The apothecaries of former days gradually usurped the office of the physician and surgeon, and adopted generally the name of the latter, their proper duties being gradually abandoned to the chemist and druggist. Many of the latter, in their turn, follow the example of the apothecaries, and prescribe for those who know no better than to think that the handling of drugs gives medical knowledge. Those whose education has gone a little further, and are aware that a knowledge of the complex structure of the frame, the functions of its different parts, their relation to each other, the symptoms which indicate organic changes and functional derangements, is a knowledge which the study of a lifetime leaves imperfect, and yet which, more or less of it, is essential to the successful treatment of disease, are much less ready to

administer drugs. The changes which have taken place in medical practice have been caused by that more careful study of facts which distinguishes modern times. The study of physiology and of chemistry has had the greatest influence on these changes; the progress of the latter has produced the most immediate change in the routine of our duties. It has enabled us to separate active principles, and to exhibit them in the form most efficient and most convenient and agreeable to the patient. It has enabled us to combine them so as to obtain an harmonious result, to form new substances with new properties, and to dispense with many laborious and wasteful processes.

The progress of science has also enabled us to dispense with many disgusting medicines (so called) which, within the memory of our grandfathers, were in extensive use. In Quincy's Dispensatory of 1742 you will find that although mummy flesh had gone out of use, worms, dogs' and horses' and peacocks' and geese's dung were in high repute, even for internal use. Chemistry has enabled us to obtain what is really useful in such things from less offensive sources and without disgusting concomitants.

Culpepper says:—"If you do but consider the universe as one united body, and man an epitomy of this body, it will seem strange to none but madmen and fools that the stars should have influence upon the body of man, considering he, being an epitomy of the creation, must needs have a celestial world within himself: for, to wind the strings a little higher, if there be a Trinity in the Deity (which is denied by none but Ranters), then must there be a Trinity also in all his works; if there be an unity in the Godhead, there must needs be an unity in all his works."

Such was the jargon of the day, and such the practice of physic, and it is not difficult to match such absurdities by others of much more recent date.

The eighteenth century witnessed a great advance in the application of facts and just reasoning to the practice of physic. The Pharmacopœias underwent a gradual change—the compounds are far less complex, laborious, and wasteful. In 1693 many of the most disgusting animals and animal excrements were still in use. Even in 1742 they are to be found in Quincy's Dispensatory, but some begin to be rejected as having been "introduced more from fancy than good reason."

Our library contains a book, under the date of 1774, entitled *Pharmacopœia Reformata*, the formulæ in which evidence a great advance in simplicity and efficacy, and many observations are made worthy of attention at the present day, amongst which I may notice those on spirit of sal volatile, exactly parallel to some recently made to the Pharmaceutical Society by Mr. Jacob Bell. Viper broth is strongly recommended. To the formulæ for wines is added a note that it is permitted to add a twentieth part of brandy, to prevent fermentation. The wine of that day would not appear to have been very strong.

The Confectio Raleighana, which appears to have originated in a prescription of Sir Walter Raleigh, was then contained in the Pharmacopœia, and was in extensive use. It contains forty-five ingredients, chiefly vegetable. Mithridate was also still to be found there, with its forty-nine ingredients, and the Theriaca Andromachi, with its sixty-six.

I have quoted a part of the jargon with which Culpepper introduces his Dispensatory in 1667. I find nothing like it in Quincy's of 1742. On the other hand, I find in the latter many facts carefully stated and correctly reasoned upon. The expansion of bodies by heat and the specific gravity of numerous bodies are carefully recorded.

The Edinburgh Pharmacopœia of 1783 witnesses a great advance. Amongst the medicines since abandoned are millipedes, crabs' eyes, and pulsatilla.

The latter half of the eighteenth century, however, witnessed the publication of absurdities, and their reception to a large extent in England, not inferior to any prevailing in the days of Culpepper. A man of the name of Mesmer, a German Doctor of Medicine, published his alleged discovery of animal magnetism and its wonderful properties. The history of this quack forms one of the most curious and instructive illustrations of the extent to which mental emotions simulate physical agencies.

I will read to you a portion of it from the *Penny Cyclopædia*, vol. ii., p. 33.

It required this experience to show us in how extraordinary a manner men may

be affected through their mental impressions, and it is so instructive that it cannot be too generally known, in the present day particularly.

Amongst the disciples of Mesmer was another notorious man called Hahnemann, whose personal history does not present the scene of rapacious imposture which distinguished that of Mesmer. As he lived until within a few years of the present time, and founded a new school of pharmacy, his doctrines form a part of the history of the science during the present century. This teacher taught what he called a new principle—that "like cures like." How far it was really new I leave to others to discuss; but Culpepper recommended the bruised head of the viper to the bite, and of the bruised stings of bees and wasps to the part stung by them, and says: "It is the opinion of those that have studied the Hermetick Philosophy, that those things which resemble any parts of man's body, strengthen those parts of the body they resemble, and help the diseases they are vulgarly incident to."

Hahnemann, in accordance with his theory, giving purgatives to produce an astringent effect, and diuretics to restrain the secretion of urine, found himself obliged to greatly diminish the dose, and it was not until by an ingenious system which forms the peculiarity of homœopathic pharmacy, he had reduced the dose practically to a nullity, that he found an approach to safety in the treatment of his patients.

One drop of fluid containing an active medicine he mixed with 99 drops of spirit to form attenuation No. 1. No 2 is formed by adding to 1 drop of this 99 drops of spirit. No. 3, by 1 drop of No. 2 with 99 drops of spirit, and so on to the 30th and even the 200th dilution, taking care that each is shaken only twice. Powders are diluted in like manner by the aid of sugar of milk. The attenuation obtained in this manner is very great even by means of small quantities of the materials. The 30th dilution which Hahnemann recommended contains a decillionth of the original drop. This quantity requires sixty figures to express it. To dilute the whole grain to a similar strength would require far more water than the whole ocean could furnish, and we have to resort to astronomy to obtain any standard of comparison of the bulk required. This treatment is not only applied to strong medicines, but to such articles as chalk, common salts, and many other substances with whose use we are familiar. A grain of Epsom salt put into one of our largest docks would form a strong homœopathic attenuation.

I find it impossible to believe that such doses produce any effect, and from what I have been able to learn, I believe that Hahnemann's theory of the proper treatment of disease is equally untenable. He gives very great prominence to the disease called *psora*, which is in English the "itch," and attributes to it a multitude of diseases. (Read proposition 73 of his "Organon.")

I am aware that some of Hahnemann's disciples have denied that by psora he meant the *itch*, but no one, I believe, did so until the discovery of the true nature of that disease, which arises from the burrowing of a minute animal. He alleged that sulphur cured the itch because it excited a similar disease when taken in ordinary doses. But even if its use could produce an eruption, by whom would it be considered a *like* disease? Only by those who could not ascertain the facts, for sulphur will not produce the itch insect. The likeness is analogous to the likeness of the moon to a silver plate, or to a man's face with eyes, nose, and mouth, all of which I could see when a child, though not now. His other proofs of his supposed law are equally inconclusive, and no such general law has ever been established.

The innocent nature of the remedies administered when the system is honestly practised induces a great number of persons to try it, particularly when, as in this town, it has been well puffed, and it is not surprising that many such, particularly under an abstinent diet, recover. These persons, unacquainted with the properties of medicine and with the difference between a small dose and an imaginary one, attribute wonderful effects to them, just as multitudes equally competent to judge believe in the efficacy of amulets. To me their faith seems as reasonable as would be the assertion that an invisible quantity of wheat would form a sufficient supply of food for our daily wants. I believe that persons who have, even slightly, studied medicine will find it impossible to believe in this system unless their minds are peculiarly constituted. An example of this may be found in the case of a late distinguished professor who is said to have believed in it, and who also wrote a book endorsing the delusions of clairvoyance. I have often in my mind likened them to

my younger child maintaining, in opposition to his sister's greater experience, that papa's kiss wonderfully relieved the pain of a bruise.

I have noticed this subject, because it has been very prominently placed before the public, and because, if it be deserving of confidence, our labours are vain and ought to be abandoned. On the other hand, I believe that the pretensions of this so-called medical science are really vain—that whenever their doses are honestly administered they are inoperative, and that there are numerous authentic cases in which their globules have been mixed together; but if administered to the patient without his knowing it, the expected effects have been produced. I have before me a bottle which was filled with belladonna globules, No. 3. The contents were eaten by a very young child, but no effect could be detected by the medical attendant called in by the alarmed parents.

I am old enough to remember several forms of quackery which have been successively patronized by large numbers. They have their day. The time will come when they, with, I believe, homœopathy, will be studied as a curious page in the history of the human mind.

The science of medicine is progressing on a sound basis, that is, a careful study of physiology and of the action of medicines. We also have a part to perform, and will, I hope, contribute to its ultimate perfection.

The Chairman objected to the discussion of the subject of homœopathy, which he thought beyond their province, on the ground that it was a theory of medicine which medical men alone were properly qualified to discuss.

Mr. Mackinlay and others supported the views maintained in the paper.

Mr. Abraham, in answer to an observation, said he thought that there was nothing in the growth of the yeast plant supplied with its appropriate food, which furnished any explanation of the supposed effect of infinitesimal doses of carbonate of lime.

ORIGINAL AND EXTRACTED ARTICLES.

ON SOME PREPARATIONS OF THE PHARMACOPŒIA.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—Your remarks on several of the preparations of the Pharmacopœia lead me to say, that I have for some time had in use a "Steel Wine" much approved, effectual, uniform, and easily made, thus :—

℞ Ferri. potassio. tart. ℥ss.
Vini Xerici. Oj. solve, et cola per charta.

It contains $\frac{2}{3}$ of a grain in each fluid drachm, or about 1 grain in an ordinary teaspoonful.

I do not agree with you in calling any preparation such as the Pil. Coloc. Co. of the P. L., 1851, a *compound Extract*, it seems to me a name scarcely correct to apply to any preparation that I know. My experience in making the Ung. Hydr. Nitrat. has been large, and I am convinced that the efficacy of the preparation depends chiefly on the surplus nitric acid which it contains; that it needs no alteration in the Pharmacopœia formula, but strict attention to the temperature, keeping it *as low as possible*, so that it can melt the lard, which I add to it cold. Experience alone will enable any manipulator to regulate it exactly.

As to Mist. Gentian. Co., I never keep it prepared, and have not had it prescribed half a dozen times since I entered business.

We do, however, want a good formula for *Mistura Sennæ Co.* in the Pharmacopœia.

Yours respectfully,

Bath, March 22nd, 1859. John C. Pooley.

INSECT-POWDER.

The so-called Persian, but properly-termed Caucasian insect-powder, has long been known to the Trans-Caucasian populations, under the name of "Guirila." In that paradise of vermin it is an article of a very considerable commerce, and is not only carried inland through Russia in large quantities, but is also exported to Germany and France. A large depôt exists at Vienna. It is a coarsely-ground powder of a green colour, and penetrating odour, formed of the flowers of the *pyrethum, carneum*, and *roseum*, which grow in the Trans-Caucasus at a height of 5000 or 6000 feet. This powder possesses the peculiarity of rapidly stupifying the insects, which

soon afterwards die. Strown about the room or the bed, it proves a poison to fleas, lice, flies, &c. In the military hospitals in hot countries it is an invaluable preventive of the formation of maggots in wounds, and the more so inasmuch as its use is attended with no disadvantage, unless employed in large quantities in closed bedrooms, when it may give rise to confusion in the head, such as is produced by flowers or new hay. It has been long used as a means of preserving insects; and cannot be too strongly recommended to those who have the care of herbarian and other natural-history collections, liable to the depredations of insects. Unfortunately the demand for the powder has been so great of late as to lead to its adulteration by the addition of the stalks and leaves of the plants to the flowers, and to the mixing of the new with stale powder. As a general rule, the powder purchasable in Germany is very different from the Asiatic in colour, smell, and efficiency.—*Buchner's Report.*

CARBONIC ACID IN SEWERS.

Dr. R. D. Thomson in his Monthly Report on the Health and Climate of St. Marylebone for February, mentions the recovery from suffocation of six men, who were employed to flush a sewer in Nassau Street. The sewer had been stopped by the refuse of a soda-water manufactory ; and, on proceeding to stir up the sulphate of lime, chalk, and free acid constituting the obstructing matter, so much carbonic acid was evolved as to produce partial suffocation. The remedy for a similar occurrence in future, was to prevent such materials from being run into the sewers—the proceedings being contrary to the local management act.

EFFECT OF FAT ON STRYCHNINE.

Dr. Pindell, in a German Journal, asserts that half a grain of strychnine will kill a dog, but that three grains mixed with fat produces no effect. In twenty cases, eleven experiments were made with strychnine alone, death resulting each time ; in nine others, the strychnine was mixed with fat, and produced no effect, notwithstanding the greatly increased dose.—*Medical Times and Gazette.*

KOUSSINE.

M. Pavesi, and subsequently M. Vée, have succeeded in extracting the active principle of kousso. The following is the process :—300 grammes of kousso are treated with 100 grammes of alcohol, and 25 grammes of hydrate of lime, at a temperature of from 140° to 150° Fah. ; the residue is also digested in 600 grammes of barley-water. The solutions thus obtained are mixed together, filtered, and precipitated by acetic acid. Koussine is yellow, bitter, insoluble in alcohol and in alkalies, and does not crystallize.

NITRATE OF SILVER STAINS.

A Chemist at Lyons announces that he has discovered the means of instantaneously removing from the hands the stains produced by nitrate of silver. It is simply to put linseed in the water.

[The above has appeared in several of the Medical Journals. We have tried the experiment, and find that the linseed has no such property as that attributed to it.]

SHEEP POISONING BY ARSENIC.

Newcastle, Feb. 26. (Before Mr. Justice Willes and a Special Jury.)

Black v. *Elliot.*

This was an action to recover compensation for the poisoning of 850 sheep by a sheep wash sold by the defendant, a chemist at Berwick.

Mr. Manisty, Q.C., and Mr. Davison appeared for the plaintiff, and Mr. Atherton, Q.C., Mr. Overend, Q.C., and Mr. Jones for the defendant.

It appeared that the plaintiff is a large farmer at New Heaton in this county, and he had recently purchased the stock, and taken the farm of his son-in-law, Mr. Brown, a farm of about 1000 acres at Burton, in addition to his own. In July last he saw an advertisement in the *Berwick Advertiser* headed "Important to Farmers," and

greatly recommending the defendant's "Celebrated Sheep-wash," for the destruction of tick, lice, and vermin in sheep. Accordingly, on the 7th of August last, the plaintiff being at Berwick, ordered sufficient of this sheep-wash to wash 700 sheep. The wash was sold in powders, and the defendant's shopman told him he would require 14 of these powders—one powder being sufficient for 50 sheep. The plaintiff ordered 15 powders, and they were sent to his Burton farm. The direction on the powders was, that each powder was to be mixed with three or four gallons of boiling water, and that then this mixture, with 4 lb of soft soap, was to be diluted with 45 gallons of cold water, and this would make a wash for 50 sheep, in which they were to be dipped. The directions were implicitly followed, and on a Saturday in July last 869 sheep were dipped in this wash—60 of them being dipped in it much diluted as they had been washed before. On the Sunday one of these sheep died. On the Monday several more died, and many were seen to be ill—foaming at the mouth and shaking their heads, and lying down. On the Tuesday a great number died ; more still on the Wednesday, until, in the course of a few days, 850 of the sheep had died, 19 only surviving, and these 19 were part of the 60 which had been dipped in the very diluted mixture. It was also found that the hands and arms of the shepherds which had been in the liquor became sore, and mortified and sloughed, and they were ill for some time. It was suggested that the sheep had been allowed to eat the herbage on which they stood after they were washed, and that a shower of rain had washed off them much of the waste and saturated the herbage of the field where they were placed, and thus poisoned them. In answer to this, it was proved that seven sheep in one of the fields, which had not been dipped, had nothing amiss with them. On the sheep all dying in this manner, Mr. Black had one of the powders analyzed, and it was admitted that it contained $1\frac{1}{4}$ lb. of arsenic, $1\frac{1}{4}$ lb. of soda ash, and 2 oz. of sulphur, each powder weighing 2 lb. 10 oz. The sheep were dissected and found to have been poisoned. They were all much swollen and black. The plaintiff then saw the defendant, who went over to his farm. The defendant said then it was a bad job, that his powders had never poisoned any sheep before, and he knew he was responsible. The defendant then sold the skins of the sheep to a skinner who joined them on the road for 2*s.* each, and the carcases were buried. The plaintiff claimed £1737 as the value of his sheep. The defendant, however, afterwards resisted this demand, and set up as a defence the improper mixing and diluting of his powders, contending that the solution made was stronger than it ought to have been according to his directions.

This case occupied the Court all day, and was resumed on Monday, Feb. 28th.

Professor Dick, of Edinburgh, *Dr. Thompson*, and *Professor Wilson*, were called to prove that the sheep, on dissection, exhibited traces of arsenic in their intestines, and as much as six grains was found in a sheep, which was quite sufficient to account for the death.

Professor Dick stated that it was scarcely possible to say in what way the arsenic was taken in ; but in his judgment it was absorbed by the skin. The mixture applied with the arsenic, soft soap and soda, would materially assist in the process of absorption.

Dr. Murray Thompson said he had analyzed one of the powders, the weight of which was 2 lbs. 10 ozs., and found arsenic to the extent of 45.82 per cent., and assuming the mixture to be as represented by the defendant and applied in the way described, 195 grains of arsenic would be absorbed by each sheep. He also analyzed the different organs of the sheep : in the liver, arsenic was not very abundant, but distinct enough ; the skin gave a trace, but in the other organs, the spleen, &c., no arsenic was found. Assuming arsenic to have got into the blood, the results were consistent with that. He considered arsenic a very capricious poison. It would sometimes poison and sometimes not, even under the same circumstances. Witness had found arsenic in the second stomach, but had it passed through the mouth, it would have been found in large quantities; there was no trace of arsenic in the contents, but in the walls of the stomach; it was possible for arsenic to have passed through the throat, but he thought it highly improbable.

Professor Wilson thought the mixture dangerous, as there was great risk of the arsenic being absorbed ; in his opinion, six grains absorbed into the blood was sufficient to kill a sheep.

This was the plaintiff's case.

Mr. Atherton then addressed the jury for the defendant, and called witnesses, who proved that the defendant's powders had been used by farmers for ten years with impunity. He had sold in the last three years as much as 500 powders a year, which was sufficient for 25,000 sheep each year, and had sold powders on an average for 20,000 sheep a year during the last ten years, and had never heard of a case of death from its use. Several farmers were called to prove that they had used the powders with impunity for washing their sheep, and on the same day as the plaintiff, so that atmospheric influences could not affect the case. It was suggested that the real reason of the wash poisoning the sheep was the hasty manner in which they had been dipped, preventing the liquor being properly squeezed and pressed out of their fleeces. Upwards of 800 sheep had been dipped in 12 hours, which was at the rate of seventy-five an hour, or five in every four minutes. This might have caused the poison to be more absorbed than it ought to have been, by being left in their fleece. In addition to that, it had been suggested that the sheep, when in a wet state, had been placed in the pastures, and the droppings from their fleeces had poisoned the herbage which they had eaten. To substantiate this theory, two sods had been cut in a field in which the sheep had pastured, the herbage of which was found to contain arsenic. Two sods cut in the adjoining field, in which none of the sheep had been placed, contained none. It was suggested that sheep would not eat this poisoned herbage; but since Saturday, when this was suggested, the experiment had been tried, and some sheep had nibbled and eaten some grass so poisoned. To prove these various facts, a number of witnesses were called, among whom were Dr. Stephenson Macadam of Edinburgh, and Mr. John Gamgee, member of the Royal College of Veterinary Surgeons, who described a number of experiments in sheep-dipping with these powders, and in no case was there any injurious result. The case occupied the Court to a late hour.

The learned Judge, in summing up, adverted at some length, and commented upon the more salient points of the evidence. In regard to the matter of compensation, which had not been the subject of inquiry during the investigation, he observed, that although the damages were laid at £1700, he thought if the jury found for the plaintiff, £1400 would be sufficient to cover the loss. Having brought before them all the points of the evidence on which, to his judgment, it was necessary to comment, he said the matter was now ripe for their decision. That decision must be founded on, whether this was a "reasonable, fit, and proper" composition to be used, according to the directions on the package, for dipping sheep. If they, turning the matter over in their own minds, thought that the result could not be reasonably attributed to any other cause than the improper composition applied on this occasion, then they ought to find their verdict for the plaintiff; but if the plaintiff had not made that out to their satisfaction, then they ought to return their verdict for the defendant. He left the case in their hands.

The jury found a verdict for the plaintiff—Damages, £1400.

A BILL FOR PREVENTING THE ADULTERATION OF ARTICLES OF FOOD OR DRINK.

(*Prepared and brought in by Mr. Scholefield, Mr. Villiers, and Mr. Wyse.*)

Ordered, by the House of Commons, to be printed, 22nd February, 1859.

WHEREAS the practice of adulterating articles of food and drink for sale in fraud of Her Majesty's subjects, and to the great hurt of their health, requires to be repressed by more effectual laws than those which are now in force for that purpose: be it therefore enacted by the Queen's most excellent Majesty, by and with the advice and consent of the Lords spiritual and temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:

I. Every person who shall sell or expose for sale any article of food or drink with which, to the knowledge of such person, any ingredient or material calculated to injure the health of persons eating or drinking such article has been mixed, and every person who shall sell or expose for sale as pure and unadulterated any article of food or drink which, to the knowledge of such person, is adulterated and not pure, shall for every such offence, on a summary conviction of the same before two Justices of the Peace, forfeit and pay a penalty not exceeding pounds nor less than

shillings, together with such costs attending such conviction as to the said Justices shall seem reasonable; and it shall be lawful for such Justices to cause the offender's name, place of abode, and offence to be published, at the expense of such offender in such newspaper or in such other manner as to such Justices shall seem desirable.

II. The vestries and district boards acting in execution of the act for the better local management of the metropolis, and the town council of every municipal borough, may, for their respective districts or boroughs, appoint one or more persons possessing competent medical, chemical, and microscopical knowledge as analysts of all articles of food and drink purchased within the said metropolitan districts or boroughs, and may provide a convenient office, and all necessary accommodation and materials, for the execution of the duties of such analysts, and may pay to such analysts such salary or allowances as they may think fit.

III. Any purchaser of any article of food or drink in any district or borough where there is any analyst appointed under this act shall be entitled, on payment of a sum not less than two shillings and sixpence nor more than ten shillings and sixpence, to have any such article analyzed by any analyst who may be appointed for such district or borough, and to receive from such analyst a certificate of the result of his analysis, specifying whether in his opinion such article is adulterated, and also whether it is so adulterated as to be injurious to the health of persons eating or drinking the same; and such certificate shall, in the absence of any evidence to the contrary, be sufficient evidence before the Justices or in any Court of Justice of the matters therein certified, and the sum so directed to be paid for such certificate shall be deemed part of the costs attending a conviction under this act.

IV. In every case where the vestry, district board, or town council of any district or borough in which there is any analyst appointed under this act shall be desirous of having an authoritative judgment as to the quality or nature of any article of food or drink, or of any material suspected to be mixed with any article of food or drink, it shall be lawful for such vestry, district board, or town council to transmit to the privy council any such article of food or drink, or any such material for analysis; and the said privy council, on receipt thereof, shall cause the same to be examined and analyzed, and shall report to such vestry, district board, or town council the result of such examination or analysis, and the privy council are empowered to appoint such persons and employ such assistance as they may require for such examinations or analyses, and to pay for the same out of any moneys which may be provided by Parliament such sums as shall be sanctioned by the commissioners of Her Majesty's Treasury.

V. It shall be lawful for the privy council from time to time to cause such analyses to be made, and to make such rules and instructions as the said privy council may think fit for regulating the use of any material or ingredient distinct from the natural composition of any article of food or drink with which it may be mixed; and it shall be lawful for such privy council from time to time in like manner to revoke and alter any such rules and instructions, and all such rules or instructions, revocations and alterations, shall forthwith, upon the issuing thereof, be published three times at the least in the *London Gazette*, and be laid before both Houses of Parliament, if Parliament be then sitting, and if not, then within one month after the commencement of the then next session of Parliament; and the *London Gazette* in which rules or instructions, revocations or alterations, were published shall be deemed sufficient evidence that the same were duly made and published as aforesaid according to this act; and every person who shall wilfully violate any such rules or instructions so made and in force for the time being as aforesaid shall forfeit for every such offence a sum not exceeding pounds.

VI. Any person who has been convicted of any offence punishable by this act may appeal to the next general or quarter sessions of the peace which shall be held for the city, county, town, or place wherein such judgment or conviction shall have been made, provided that such person enter into a recognizance within two days next after such conviction with two sufficient securities conditioned to try such appeal, and to be forthcoming to abide the judgment and determination of the Justices at such general or quarter sessions, and to pay such costs as shall be by such last-mentioned Justices awarded; and the Justices before whom such conviction shall be had are hereby empowered and required to take such recognizance; and the Justices at such general or quarter sessions are hereby authorized and required

to hear and finally determine the matter of every such appeal, and they may, according to their discretion, award such costs to the party appealing or appealed against as they shall think proper.

VII. If any such conviction or judgment or order of forfeiture shall happen to be made within six days before any general or quarter sessions of the peace shall be held for the city, county, town, or place wherein such conviction shall have been made, the person who shall think himself aggrieved by any such conviction may, on entering into a recognizance in manner and for the purposes before directed, be at liberty to appeal either to the then next or next following general or quarter sessions of the peace which shall be held for any such city, county, town, or place wherein any such conviction shall have been made.

VIII. The provisions in the nuisances removal act for England, 1855, as to procedure, and the provisions of the act of the eleventh and twelfth years of Her present Majesty, intituled "An act to facilitate the performance of the duties of Justices of the Peace and of session, within England and Wales, with respect to summary convictions and orders," so far as the same are respectively applicable, shall extend and apply to cases arising under this act ; and all moneys arising from penalties under this act in any district or borough where there are analysts appointed under this act shall, when paid or recovered, be paid to the vestry, district board, or town council for such district or borough respectively, to be applied for the general purposes of such vestry, district board, or borough respectively.

IX. The expense of executing this act shall be borne, in the metropolis, out of any rates or funds applicable to the purposes of the act for the better local management of the metropolis, and in boroughs out of the borough fund.

X. In the construction of this act the words "articles of food or drink" shall (if not inconsistent with the context or subject matter) include not only all alimentary substances, whether solids or liquids, but also all eatables or drinkables whatsoever not being medical drugs or articles usually taken or sold as medicines.

XI. This act shall not extend to Scotland or Ireland.

POISONING BY LAUDANUM.

An adjourned inquest has been held by Mr. L. M. Cockcroft, deputy coroner at Seaton Delaval, on the body of Benjamin Lowther, a child two years of age, who died at Shankhouse Colliery from an overdose of laudanum, administered by its mother under the impression that it was tincture of rhubarb. From the evidence, it appeared that on Wednesday night, March 16, Jane Lowther, mother of the deceased, went to a woman named Johnson (who keeps a small shop, and with apples, oranges, sweetmeats, &c., keeps also for sale spirit of nitre, tincture of rhubarb, and castor oil) for a pennyworth of tincture of rhubarb for her child, who had a bad cough and could not sleep. The tincture was poured into the cup, and was mixed by the mother with warm coffee and sweetened with sugar. A teaspoonful of the mixture was given to the child, who slept all night, but in the morning, the cough returning, another spoonful was given, and the child wishing for more, was allowed by the mother to drink from the cup. The child then fell into a state of stupor; Mr. Craggs, a medical man, was sent for, who, by the application of cold water and friction, endeavoured to arouse the child; emetics were also tried, but without effect, and the child died at ten o'clock in the evening. The bottle from which the tincture was taken was obtained from Johnson, and its contents was stated in the evidence of Mr. Ferguson, assistant of Mr. Davison, surgeon, to be laudanum. A *post-mortem* examination was also made by Mr. Ferguson, who was of opinion that death was caused by opium; although, after applying all the tests for opium, he was unable to detect it.

Margaret Ransom deposed that she had, at the request of Johnson, obtained the tincture of rhubarb of Mr. Fairs, chemist, 3, Newgate Street, Newcastle, and was served by Thomas Wilkinson, the apprentice; the latter, however, had no recollection of the transaction. The Coroner then summed up, adverting to the principal points in the case:—1st. Was the death of the child caused by the administration of that laudanum on Thursday ? 2nd. Were they satisfied that that was the same medicine that was purchased at Mr. Fairs, and a portion of which was eventually taken by the child, and caused its death? 3rd. Had the young man Wilkinson been

guilty of gross negligence in selling, as was alleged, laudanum instead of tincture of rhubarb? The jury returned a verdict to the effect that the deceased had been accidentally poisoned by an overdose of laudanum, and at the same time expressed a wish that a caution might be administered to the young man Wilkinson. Mrs. Johnson was also cautioned against, in future, dealing in drugs.

POISONING BY ACONITE-ROOT.

James D., aged 58, was admitted into St. Mary's Hospital, under the care of Dr. Alderson, on July 11th, at five minutes before one in the morning. He was a gardener, and acquainted with the properties of plants ; and, being in great distress, had dug up a quantity of aconite-root, and dried it, with the intention of committing suicide. This intention he carried into effect on the night of admission, about eight o'clock, by eating a quantity of it. At eleven, being in very severe pain, he called some of his neighbours, and told them what he had done. The person who was with him said that he had most severe pain in the stomach, with vomiting and purging; occasionally he seemed very dizzy, and lost consciousness for a few seconds, but at other times was quite sensible. When admitted, about five hours after taking the poison, he was in a state of collapse, very pale; the skin was cold and perspiring; pulse slow, intermittent, and scarcely perceptible; the bowels were relaxed. He was quite conscious. Stimuli and animal charcoal were administered, but he died twenty minutes after admission.—*Brit. Med. Journal.*

SUICIDE BY ESSENTIAL OIL OF ALMONDS.

On the 19th ult., as Thomas Monkhouse was digging a grave in the Kendal Cemetery, his attention was called to the body of a man lying on the ground near a headstone. Upon examination it was ascertained that the person was quite dead, and a bottle was found in his pocket containing essential oil of almonds, with which he had poisoned himself. About half an hour before the fatal act he had come to the gravedigger, and asked him if he had not seven graves open. Receiving a reply in the affirmative, the wretched man went away, and shortly afterwards made further work for the sexton by swallowing the deadly poison already mentioned. The wretched man had formed an attachment to a widow, which was not returned, and when his dead body was found it was lying at the headstone of the grave of the widow's late husband. The deceased was thirty-nine years of age.—*Times*, March 1st.

ROYAL INSTITUTION.

The Friday evening Meetings of the members of this Institution, and their friends, were commenced on the 28th of January, when the chair was occupied by

SIR HENRY HOLLAND, BART., M.D., F.R.S.,

And a discourse was delivered

ON THE ELECTRICAL DISCHARGE, AND ITS STRATIFIED APPEARANCE IN RAREFIED MEDIA.

BY W. R. GROVES, ESQ., Q.C., F.R.S.

The speaker proposed first shortly to state the extent of knowledge we possess respecting the electrical discharge; then to pass to certain peculiar phenomena first discovered by him in 1852, and subsequently experimented on by others, and most elaborately by Mr. Gassiot ; and then to offer an opinion as to their cause or rationale.

The best mode of examining and attempting to explain the electrical discharge is to compare it with its nearest analogue flame, to which one form of the discharge, viz. the voltaic arc, has much seeming resemblance. The flame of a common candle results, as is well known, from the chemical combination of carbon and hydrogen with the oxygen of the air; and the combustion is most brilliant where the heated gases and particles are in proximity to the oxygen. It forms a hollow cone, as the oxygen of the air, being consumed or combined into water and carbonic acid at the exterior portion, cannot reach the interior: the course of the currents of heated air, and the particular form of this hollow cone of flame, are beautifully

shown by the refraction it produces on a more brilliant light, such as that of the electric lamp; the flame issues from a single nucleus, the wick; and the amount of heat produced is definite for a definite amount of chemical combination.

In the voltaic arc there are two points or *foci*; the polar terminals there undergo a change, but not a consumption equivalent or nearly so to the heat and light produced; but if the consumption of the zinc or the quantity of it combined with oxygen in the cells of the battery be compared with the amount of heat generated in the arc, plus that in the cells of the battery and conducting wires, the same amount of total heat will be found to be developed as if the same quantity of zinc were simply burned in oxygen.

By subdividing more and more the plates of the voltaic battery and proportionately increasing their number, we gradually increase the length and diminish the volume of the arc, until at length we arrive, as in the voltaic columns of De Luc and Zamboni, at the electric spark.

The spark from a Ruhmkorff coil was projected on a screen by the electric lamp, and the impression contrasted with that of the flame of a candle; in the former two cones are seen to issue from the terminals instead of the single one of the latter, one being more powerful, and overcoming or beating back the other; and this effect is reversed as the direction of the current is reversed.

In all cases hitherto observed there is a dispersion or projection of a portion of the terminals; this takes place in all forms of electric disruptive discharge, whatever be the materials of which the terminals are composed. In the voltaic arc there is a transmission of matter, principally from the positive, which is the more intensely heated, to the negative terminal; in the spark from the Ruhmkorff coil the dispersion is principally, and in some cases appears to be entirely, from the negative terminal, while this is now the more intensely heated.

In addition to this, there is generally, but not always, a change produced in the medium across which the discharge passes; compound liquids, vapours, and gases are decomposed, and even elementary gases are allotropically changed. There is also a polar condition of the electrical discharge, which produces the converse chemical effects at each pole—effects described by Mr. Grove in a paper in the Philosophical Transactions for 1852, and subsequently shown at an evening meeting of this Institution.

Gases offer a powerful resistance to the passage of the discharge, but this resistance is diminished as the gases are rarefied; and a discharge which would not pass across a space of half an inch in air of the ordinary density will pass through several feet in highly attenuated air.

In experimenting on the passage of the discharge through the vapour of phosphorus in 1852, Mr. Grove observed for the first time that the discharge was traversed by a number of dark bands or striæ. At first he was disposed to attribute this phenomenon to some peculiarity of the medium; but on trying good *vacua* of other vapours and gases, he found the striæ were in all cases visible, and seemed to depend on the degree of rarefaction of the gas. Many subsequent experiments have been made by himself and others on the subject, and more particularly by Mr. Gassiot; and the extent of knowledge we have acquired upon this still mysterious phenomenon was now discussed and illustrated.

In the vapour of phosphorus the striæ generally exhibit themselves like narrow ruled lines, about 0.05 inch diameter, transverse to the line of discharge; but with certain precautions they become wider and assume a conical form, somewhat resembling the whalebone snakes made as a toy for children. Mr. Gassiot has used most carefully prepared Torricellian *vacua*, and has also, in conjunction with Dr. Frankland, obtained excellent *vacua*, by filling tubes containing sticks of caustic potass with carbonic acid, exhausting them by the air-pump, and allowing the residual gas to be absorbed by the carbonic acid.

The following is a summary of the effects produced by the electric discharge through these *vacua*.

If the vacuum be equal to that generally obtained by an ordinary air-pump, no stratifications are perceptible; a diffused lambent light fills the tube: in a tube in which the rarefaction is carried a step further, narrow striæ are perceptible, like those first described in the phosphorus vapour experiment. A step further in rarefaction increases the breadth of the bands; next we get the conical or cup-

shaped form; and then, the rarefaction being still higher, we get a series of luminous cylinders of an inch or so in depth, with narrow divisions between them. Lastly, with the best vacua which have been obtained, there is neither discharge, light, nor conduction.* The fact of non-conduction by a very good Torricellian vacuum was first noticed by Walsh, subsequently carefully experimented on by Morgan (Philosophical Transactions, 1785), and subsequently by Davy (1822); the latter did not obtain an entire non-conduction, but a considerable diminution both of light and conducting power.

From these repeated experiments it may fairly be considered as proved, that *in vacuo*, or in media rarefied beyond a certain point, electricity will not be conducted, or, more correctly speaking, transmitted; an extremely important result in its bearing on the theories of electricity.

The gradual widening of the strata, as the rarefaction proceeds, is in favour of the phenomena of stratification being due to mechanical impulses of the attenuated medium, and appears to support the following rationale of the phenomenon given by Mr. Grove, who does not advance it as conclusive, but only as an approximation to a theory to be sifted by further experiments. When the battery contact is broken, there is generated the well-known induced current in the secondary wire in the same direction as the original battery current, to which secondary current the brilliant effects of the Ruhmkorff coil are due: but in addition to this current in the secondary wire, there is also a secondary current in the primary wire, flowing in the same direction; the induction spark, at the moment following the disruption of contact, completing the circuit of the primary, and thus allowing the secondary current to pass. This secondary current in the primary wire produces in its turn another secondary, or what may be termed a tertiary, current in the secondary wire, in an opposite direction to the secondary current. There are thus, almost synchronously, two currents in opposite directions in the secondary wire; these, by causing a conflict or irregular action on the rarefied medium, would give rise to waves or pulsations, and might well account for the stratified appearance. The experimental evidence in favour of this view is as follows: when a single break of battery contact is made by drawing a stout copper wire over another wire, the striæ do not invariably appear in the rarefied medium through which the current of the secondary wire passes. This would be accounted for on the above theory by supposing that in some cases of disruption the induced spark passes across immediately on disruption, and thus completes the circuit for the secondary current in the primary wire; while in other cases, either from want of sufficient intensity, or from the mode or velocity with which contact is broken, or from the oxidation of the points where contact is broken, there is no induced spark by which the current can pass; in the former case there would be a tertiary current in the secondary wire, and therefore striæ; in the latter there would be none.

But the following experiment is more strongly in favour of the theory. It is obvious that the secondary must be more powerful than the tertiary current. Now, supposing an obstacle or resistance placed in the secondary circuit, which the secondary current can overcome but the tertiary cannot, we ought by the theory to get no striæ. If an interruption be made in the secondary current in addition to that formed by the rarefied medium, and this interruption be made of the full extent which the spark will pass, there are, as a general rule, no striæ in the rarefied medium, while the same vacuum tube shows the striæ well if there be no such break or interruption. The experiment was shown by a large vacuum cylinder (16 inches by 4) of Mr. Gassiot, and his micrometer electrometer; this tube showed numerous broad and perfectly distinct bands when the points of the micrometer were in contact; but when they were separated to the fullest extent that would allow sparks to pass, not the slightest symptom of bands or striæ was perceptible, the whole cylinder was filled with a uniform lambent flame. With a spark from the prime conductor of the electrical machine, the striæ do not appear in tubes which show them well with

* The production of vacua by carbonic acid, and the increasing breadth of the stratifications with increased rarefaction, was communicated by Mr. Gassiot in a paper, read to the Royal Society, Jan. 13, 1859. I incline to think that oxy-hydrogen gas, with potash, might give a better vacuum than carbonic acid, as the last residual portions of the gas would be slowly combined by the discharge, and the water so formed absorbed by the potash.—W. R. G.

the Ruhmkorff coil; occasionally, and in rare instances, striæ may be seen with sparks from the electrical machine, but, not as far as Mr. Grove has observed, when the spark is unquestionably single. All this is in favour of the theory given above; but without regarding that as conclusive or as a proved *rationale*, it is clearly demonstrated by the above experiments that the identical vacuum tubes which show the striæ with certain modes of producing the discharge, do not show them with other modes, and that therefore the striæ are not a necessary condition of the discharge itself in highly attenuated media, but depend the mode of its production.

The study of the electrical discharge *in vacuo* is of the utmost importance in reference to the theories of electricity, and probably will assist much towards the proper conception of other modes of force, or, as they are termed, *imponderables*, heat, light, &c.

The experiments of Walsh and Morgan, corroborated as they now are by that of Mr. Gassiot, show that, although the transmission of electricity across gaseous media is aided by rarefaction of the medium up to a certain degree, yet that a degree of attenuation may be reached at which the transmission ceases, at all events for a given distance between the terminals and given intensity of electrical charge. Whether having arrived at this point a reduction of the space to be traversed, or an increase of intensity in electricity, or both, would again enable the electricity to pass, is not quite clear, though there is reason to believe that it would, and the increased intensity of electricity would probably be again stopped by a further improvement in the vacuum, and so on. But the experiments go far to prove that ordinary matter is requisite for the transmission of electricity, and that if space could exist void of matter, then there would be no electricity; thus supporting the views advocated by Mr. Grove and some others, that electricity is an affection or mode of motion of ordinary matter.

The non-transmission of electricity by very highly attenuated gas may also afford much assistance to the theory of the aurora borealis, a phenomenon, the appearance of which, the regions where it is seen, its effect on the magnet, and other considerations, have led to the universal belief that it is electrical.

The experimental result that a certain degree of attenuation of air forms a good conductor, or easy path for the electrical force, while either a greater or a less degree of density offers more resistance, and this increasing towards either extremity of density or rarefaction, shows, that if there be currents of electricity circulating to or from the polar regions of the earth, the return of which, as is generally believed, gives rise to the beautiful phenomena of the aurora borealis or australis, the height where this transit of electricity takes place would be just that at which the density of the air is such as to render it the best conductor. By careful measurement of the degree of attenuation requisite to enable the electrical discharge to pass with the greatest facility in our laboratory experiments, we may approximatively estimate the degree of rarefaction of the atmosphere at the height where the aurora borealis exists. By these means we get a mode of estimating the height of the aurora by ascertaining, from the decrement of density in the atmosphere in proportion to its distance from the earth, at what elevation the best conducting state, or that similar to our best conducting vacuum tubes, would be found, or, conversely, by ascertaining the height of the aurora, by parallactic measurements, we may ascertain the ratio of decrement in the density of the atmosphere. Thus, by our cabinet experiments, light may be thrown on the grand phenomena of the universe, and the great questions of the divisibility of matter, whether there is a limit to its expansibility, whether there is a fourth state of attenuation beyond the recognized states of solid, liquid, and gaseous, as Newton seemed to suspect (30th query to the Optics), and whether the imponderables are specific affections of matter in a peculiar state, or of highly attenuated gaseous matter, may be elucidated. Though the entire solution of such questions be beyond the power of man, we may ever hope to gain approximative knowledge. The manageable character of the electrical discharge, and the various phenomena it exhibits when matter is subjected to its influence in all those varied states which we are enabled, by experiment, to reduce it, can hardly fail to afford new and valuable information on these abstruse and most interesting inquiries.

W. R. G.

On Friday, the 25th of February, the chair was occupied by

H.R.H. THE PRINCE CONSORT, K.G., D.C.L., F.R.S.,
Vice Patron of the Institution.

On this occasion Professor FARADAY delivered a discourse

ON SCHÖNBEIN'S OZONE AND ANTOZONE,

Of which the following is a brief outline:—

OZONE had already been before the members of the Royal Institution on two occasions: on the 13th of June, 1851, when Schönbein's early views of it were given, and on the 10th of June, 1853, when the results of MM. Frémy and E. Becquerel, obtained by passing the electric spark through dry oxygen, were described; and also the opinion of Schönbein respecting the entrance of ozone as such (and not as simple oxygen) into combination. Since then, Schönbein has been led to the belief that oxygen can exist in a third state, as far removed by its properties from ordinary oxygen in the one direction as ozone is in the other; and therefore, in a certain sense antagonistic to ozone. This substance he names *antozone*, and believes that it also enters into combination, retaining, for the time, its special properties. Hence, there are not merely ozone and antozone, but also ozonide and antozonide compounds. Thus, permanganic acid, chromic acid, peroxides of manganese, lead, cobalt, nickel, bismuth, silver, &c., form a list of bodies containing more or less of ozone in combination; and the characters of ozone and of these bodies, because of the ozone in them, is that they are electro-negative to the antozonides, *i.e.* as copper to zinc; they evolve chlorine from chlorides; they cannot generate peroxide of hydrogen; and they render blue the precipitated tincture of guaiacum. On the other hand, oxywater and the peroxides of potassium, sodium, barium, strontium, and calcium, form a list of substances containing antozone. These bodies are electro-positive to the former; they cannot evolve chlorine from hydro-chloric acid, or the chlorides; they evolve the peroxide of hydrogen when treated either by oxy-acids or even the hydro-chloric acid, and they not only do not render blue the white precipitated guaiacum, but they restore that which has been rendered blue by ozone to the white or colourless condition. Now when two ozonides or two antozonides are put together, with the addition of water or an indifferent acid, they mingle, but do not act on each other; but if one body from each list be associated in like nanner, they mutually act, oxygen is evolved from both, and ordinary oxygen is set free; or rather, as Schönbein believes, ozone separates from one body, and antozone from the other; and these uniting produce the intermediate or neutral oxygen. Thénard, who discovered the peroxide of hydrogen, showed that the peroxide of silver, when brought into contact with it, not only caused the separation of part of the oxygen of the fluid, but also itself lost oxygen, that element leaving both bodies and appearing in the gaseous state. This experiment, with others of a like nature, and many new ones, were referred to and made in illustration of Schönbein's views. As to the independent existence of oxygen in these two new and antithetical states, ozone has been so obtained, *i.e.* out of combination, and independent of any other body; but antozone has not as yet afforded this proof of its possible separate condition. Oxywater is the compound in which it seems nearest to a free condition. As Schönbein's view includes the idea that oxygen in these two states can retain their peculiar properties when out of combination, and have them conferred otherwise than by combination, and as ozone does fulfil these conditions and does exist in the independent state, so it is important that antozone should be pursued by experiment until it gives a like result.

In relation to this subject the view of Mr. Brodie should be referred to, respecting the condition of certain elements at the *moment* of chemical change, on which he published a paper in the Phil. Trans. for 1850, p. 759, and another in the Chemical Society's Journal in 1855. He assumed oxygen as capable of existing in two states; the particles being polarized to each other by the action of associated particles, and for the moment in the relation of oxygen and hydrogen to each other; he also made many numerical experiments for the purpose of obtaining the equivalent action of the oxygens assumed to be in these opposed polar states. M. F.

OBITUARY.

DEATH OF SOUBERAIN.

Pharmacy has lost one of its most eminent professors by the death of Eugène Souberain, Director of the Central Pharmacy of the Hospitals, Professor of Pharmacology to the Faculty of Medicine, Member of the Academy of Medicine and of the Council of Health, one of the editors of the *Journal de Pharmacie et de Chimie*, Honorary Member of the Pharmaceutical Society of Great Britain, &c. &c.

Souberain was born at Paris, in May, 1796 (le 4 prairial de l'an V.), and studied at the college of Louis-le-Grand. In 1811 he worked at a *blanchisserie bertholliene*, which his father, owing to reverse of fortune, had founded at Bezons, near Paris. In 1813 he went to Montpellier, where he entered the Pharmacy of M. Pouzin as a pupil; he subsequently, however, returned to Paris, and finished his term with M. Montillard, in the Rue St. Honoré.

At Paris, as at Montpellier, his leisure time was employed by study, and in 1819 he entered the "*internat*" of the hospitals, having won the first position at the competition. Here he remained three years, and, at the examinations of the Ecole de Pharmacie, he carried off all the first prizes in the natural and physical sciences.

The office of Pharmacien en Chef to the Hôpital de la Pitié being vacant, he competed for it, and obtained the appointment. While here, he published his first work upon soluble cream of tartar, and the part the boracic acid plays in its composition, and it may be said that from that time he continued to fill the *Journal de Pharmacie* with his works and observations.

In 1832, the administration of the hospitals having to appoint a successor to M. Henry, selected M. Souberain, whose rare qualities recommended him to their choice, and he was consequently appointed Director of the Pharmacie Centrale, a position which he held until his death.

In 1826 he had opened a course of lectures on pharmacy, and in 1834 he was appointed Professor of Physics to the Ecole de Pharmacie. As a teacher he was remarkably attractive for the clearness and lucidity of his style and the happy method of his illustrations. At the death of Robiquet he was elected General Secretary of the Société de Pharmacie, where he appears to have won universal favour from the indefatigable zeal with which he performed his duties, entering into and directing the discussions with the remarkable talent which distinguished him as a professor and the authority derived from his great acquirements. Upon his appointment, however, as Professor of Pharmacology to the Faculty of Medicine, he resigned this office, although he still continued to contribute the results of his experience and observation.

His most recent communications to the Society were upon the sulphurous waters of the Pyrenees, and a process for the preparation of Hydriodic Ether.

The following are among the most important of the works published by Souberain:—

"A Manual of Pharmacy, Theoretical and Practical." 1 vol. This work was published while Souberain was Pharmacien en Chef to the Hôpital de la Pitié, 1827.

"Un nouveau Traité de Pharmacie," which went through three editions. (2 vols. 8vo.)

"A Memoir upon the Oxygen Compounds of Chlorine," which contains an announcement of the discovery of Chloroform by Souberain.

"Upon the Relation between the Botanical Characters and Medicinal Properties of Plants." This paper has been signalized by the Society of Sciences of Haarlem.

"A Study of Humus, and its Influence upon Vegetation." This Memoir was also signalized by the Agricultural Society of the department of the Seine-Inférieure.

"Upon the Boro-tartrates and Soluble Cream of Tartar."

"On the Muriates of the Ammoniaco Mercurials."

"On Boracic Acid and the Borates."

"On the Fabrication of Iodine."

"On the Carbonates of Magnesia and the Carbonates of Iron."

"On Emetics."

"On the Seeds of Euphorbiaceæ."

"On the Reciprocal Action of Acids and Saline Solutions."

"On the Camphors of Turpentine, Citron, Cubebs, Juniper, &c."
"On the Sulphide of Nitrogen, and on the Ammoniacal Sulpho-Chlorides."
"On Arsenuretted Hydrogen."
"On the Molecular Changes which Sugar undergoes under the Influence of Heat."
"On the Fermentation of Sugars."
"On Glucose and its Combinations with Bases."
"On the Sugar of Fruits and a New Species of Sugar."
"On the Commerce in Leeches, and the proper means of Restocking the Pools of France."
"On a Method of Disgorging Leeches." This paper, which was published in association with M. Bouchardat, resulted in diminishing the expenses of the French hospitals for leeches by 40,000 fr. per annum.

Souberain leaves a son, who is in the Ecole de Pharmacie, and also a daughter, the wife of M. Regnault, Professor of Physics to the same school.

BOOKS RECEIVED.

A System of Dental Surgery. By John Tomes, F.R.S., Dentist to the Dental Hospital of London, and to the Middlesex Hospital. (With 208 Illustrations.) London: John Churchill, New Burlington Street. 8vo, pp. 599. 1859.

This Manual supplies a want which has long been felt by the Pharmaceutist, who is frequently applied to respecting some of the practical details of Dentistry. The works previously published have been chiefly devoted to some particular branch, but Mr. Tomes's Manual embraces the whole subject, and is written in clear and forcible language, which, with the numerous well-drawn illustrations, render the work all that can be desired.

On Poisons in Relation to Medical Jurisprudence and Medicine. By Alfred Swaine Taylor, M.D., F.R.S., &c. &c. (Second Edition.) London: John Churchill, New Burlington Street. 8vo, pp. 863. 1859.

Chloroform and other Anæsthetics; their History and Use during Childbirth. By John Chapman, M.D., &c. London and Edinburgh: Williams and Norgate. 1859.

The Dental Review. London: H. Baillière, Regent Street. Paris: Rue Hautefeuille. New York: Broadway. Philadelphia: Lindsay and Blakiston. Nos. 1, 2, and 3.

An Examination of the Question of Anæsthesia. By the Hon. Truman Smith, U.S., Senator from Connecticut. New York: John A. Gray, Printer, 16 and 18, Jacob Street. 1858.

TO CORRESPONDENTS.

A Chemist (Barnsley) assigns the following reasons why the Pharmaceutical Society does not include all or nearly all the Chemists and Druggists in the kingdom:—First, because two guineas a year was too much to pay at the commencement, for what was *then* a problematical benefit. Secondly, when the invitation to admit new members on the reduced terms was made, it was made in the *Pharmaceutical Journal*, and, therefore, did not become extensively known.

On the first question opinions differed; some thought there should have been an entrance fee in addition; some might have thought half a guinea too much. Secondly, besides the invitations in this Journal, many thousand circulars were sent throughout the country to all the Chemists whose names could be obtained, and "to the Chemist of——" in towns where no name was known, explaining fully the state of the case, and the kind of certificate of qualification required. The proposition to reopen the question by repeating the circular could scarcely be entertained; but in any fresh arrangement affecting the trade interests of Chemists and Druggists generally, the vested rights of those in business at the date of such act would of course be protected.

D. D. (Liverpool).—The new Pharmacopœia is expected to be issued in the course

of this year. It will apply to Scotland and Ireland as well as England, and Committees are at work upon it in London, Edinburgh, and Dublin.

G. (London).—*Chemisches Central Blatt.*

W. B. (London).—Dr. Pappe's *Flora Capensis Medicæ Prodromus* may be obtained of Ward and Co., 27, Paternoster Row, price 2*s.*, a few copies of the second edition of the work having been sent to this country for sale.

C. (Holywell).—(1.) Crayons for chalk drawings are made with pipe or china clay paste, intimately mixed with the required pigment, then moulded and dried.—(2.) Fowne's *Manual of Chemistry.*

"*Polassæ*" (Altrincham).—In the prescription alluded to, *Carbonate* of potash (not bicarbonate) is intended, which, if added to a small quantity of the water, and then shaken together with the oil, will form a very good emulsion; then add the syrup, and the remainder of the water gradually.

H. R. (Selby).—(1.) Hooper's *Medical Dictionary.*—(2.) Through any bookseller.

S. S. S. (Willenhall).—Balfour's *Manual of Botany*, and Lindley's *Introduction to Botany.*

E. W. (Salford).—(1.) It has been urged repeatedly without success.—(2.) The specimen of quackery has been received.

Q. Z. (Essex).—Of the labels No. 1 is liable to stamp duty. No. 2 is not.

Phœnix (Jersey).—(1.) There is no conclusive test for atropine; sulphuric acid and bichromate of potash produce with it green oxide of chromium. See *Taylor on Poisons*, page 831.

T. S. K. (Rochester).—See page 489 of this number.

A Member (Gainsboro').—Common sealing-wax may be made as follows:—Venice Turpentine 4 oz., Shell-lac 7 oz., Cinnabar 4 oz., Magnesia (with oil of turpentine) 1½ drachm.

Juvenis (Wolverhampton).—By "*Spt. Etheris Chlor.*" we should suppose Chloric Ether is intended.

Messrs. Newbery and Sons (London).—The Cod-Liver Oil Cakes were laid on the table at the last Pharmaceutical Meeting. See page 502.

P. W. (Taunton).—We are unable to give the information.

D. W.—The communication was accidentally omitted last month. It contains a repetition of the old grievance—the late hours of business, which are stated as the obstacle to the studious habits of young men, and the reason that scientific institutions are not more resorted to by them. [This may be sometimes the case. It sometimes also happens that when urged to attend lectures, &c., and every facility given, they decline. See our number for February, p. 439.]

Newcastle-on-Tyne.—It is satisfactory to find that recent discussions about the Poison Bill have had the effect of bringing the members together, and reviving a plan for the delivery of two or more courses of lectures, of which we hope to be able to announce the particulars next month.

The Sale of Poisons Bill is postponed to Friday, April 8th. At page 481, the following should have been added to the title:—A Bill to regulate the Keeping and Sale of Poisons. Prepared and brought in by Mr. Secretary Walpole, Mr. Hardy, and Lord John Manners. Ordered, by the House of Commons, to be printed, 8 February, 1859.

Instructions from Members and Associates, respecting the transmission of the Journal, before the 25th of the month, to the Secretary, Elias Bremridge, 17, Bloomsbury Square, W.C.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington St. Other communications to the Editor, 15, Langham Place.

THE PHARMACEUTICAL JOURNAL.

VOL. XVIII.—No. XI.—MAY 2nd, 1859.

THE DEMISE OF THE SALE OF POISONS BILL.

After the description in our last number of the mutilated and emaciated condition to which the "Sale of Poisons Bill" was reduced, it was scarcely to be expected that it could survive many days. It had become an object of contempt and aversion with all parties. Its first parents could scarcely recognize any of its features; its step-father was perplexed with its incompatibilities; it was objected to by Pharmaceutical Chemists because it ignored all distinction founded on qualification, and it was generally unpalatable to all dealers in poisons as an inconvenient interference with their business. Its prospects, therefore, were anything but encouraging, even on the supposition that it would survive until the third reading, and every week that the question was delayed, added to the force and increased the complication of the threatened opposition.

At a meeting of the Poison Bill Committee of the Society, held April 1st, the Secretary reported under what circumstances the interview with the Home Secretary (mentioned in our last number) was obtained; and the deputation stated in detail what transpired on that occasion. This not being considered satisfactory, and the provisions of the Bill having been again considered and discussed *seriatim*, a resolution was moved and carried unanimously, to the effect that the Sale of Poisons Bill now before the House of Commons, containing no present or even prospective provision for qualification in the vendors of poisons; embodying very objectionable and absolutely impracticable clauses; and having been deprived of the small recognition of a distinction founded on qualification, as contained in the Bill in its previous form, the Committee recommend the Council to take active and immediate steps for the opposition of the Bill. A petition was prepared to emanate officially from the Council of the Pharmaceutical Society; but before time had been allowed for any further proceedings, information was received at the Home Office by the Secretary that the Bill would be at once withdrawn. The defeat of the Ministers on the Reform Bill, and the consequent dissolution of Parliament, carried the Sale of Poisons Bill, with other measures both small and large, in the vortex of the general crash.

BRANCH ASSOCIATION OF THE PHARMACEUTICAL SOCIETY AT NEWCASTLE AND GATESHEAD.

Several efforts have been made to establish an effective branch of the Pharmaceutical Society at Newcastle-on-Tyne. The chief of these was in the year 1852,* shortly after the passing of the Pharmacy Act, when a meeting was convened for the purpose of discussing the provisions of the Act, and with the object of promoting its beneficial influence on the position and character of the Pharmaceutical body, by inducing as many as possible to come within its operation, and assist in carrying out the system of education introduced by the Society. Invitations were not confined to members of the Society, but were sent generally to the Chemists of Newcastle, Gateshead, and the neighbouring towns. The attendance was sufficiently numerous to afford an encouraging prospect, and those who were present entered into the subject warmly, and with a very unanimous feeling in favour of increasing, as much as possible, the influence and extending the educational operations of the Society. Mr. Gilpin was requested to act as Secretary, and a Committee was appointed to communicate with other Chemists in the locality and neighbouring towns, to act in concert with the Council of the Society in London, and to consider as to the practicability of affording facilities for the improvement of assistants and apprentices. Some accession to the list of members resulted from this movement, but the demand among the young men for improved education was not then sufficient to give vitality to that part of the project.

The recent agitation respecting the Sale of Poisons Bill furnished another occasion for bringing the members together, for the purpose of being prepared with such defensive measures as circumstances might require. The result of the consultation among the members was a general approval of the course which had been taken, and the amendments proposed by the council. A meeting was also called by Chemists, not members of the Society, from which, however, members were not entirely excluded, and therefore the merits of the question on both sides were fairly discussed. In the first instance, some of those present appeared to be very incorrectly informed as to the nature and objects of the Pharmaceutical Society, and its influence on the trade in general. An idea seemed to be afloat that it was a kind of exclusive monopoly, intended for the benefit of the few to the comparative detriment of the many; and some of the old arguments, which have been disposed of years ago, were partially revived. A member present corrected these erroneous impressions, and gave a concise sketch of the origin, objects, and progress of the Society, showing what it has effected up to the present time, and how much more it might have done, if the entire body of Chemists and Druggists had joined it at the origin. The discussion reverting to the Sale of Poisons Bill, it became obvious to the meeting that the only effectual protection against such vexatious and annoying legislation would be the separation of the entire body of respectable and *bonâ fide* Chemists and Druggists from the multifarious class of uneducated vendors of drugs in chandlers' shops, drug stalls, &c., who are continually involving the whole class of Chemists and Druggists in disgrace by their incompetence and carelessness, thus causing a pretext for obnoxious legislative interference, in which the educated and the ignorant are placed on the same level and treated alike. The general impression resulting from the discussion was favourable to the progress of Pharmaceutical education. Many regretted that they had not joined the Society at the time they were invited to come in, but the importance of associating together was not, at that time, so fully understood.

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* Vol. xii., No. 3, p. 118.

Taking advantage of the prevailing disposition to promote and support an advance in the right direction, some of the most active members in the locality have persevered in the undertaking. Premises are engaged, two courses of lectures are announced, scientific meetings are in contemplation, and a School of Pharmacy, on a moderate scale, is about to be opened, having facilities for extension and enlargement to meet any demand that may arise for Pharmaceutical instruction.

The building taken for the meetings is an insulated one, being the old Racket Court of the town, and is in a convenient situation. A portion of it is sub-let at present, leaving accommodation for the lectures and meetings. In the event of a laboratory being desired, and the number of students being sufficient to justify such expenditure, this might be easily arranged by taking into occupation the entire building.

The lectures at present announced are—

A course of thirteen lectures on BOTANY, including structural botany, vegetable physiology, and the classification of plants, by Mr. H. B. BRADY, F.L.S. ; commencing Monday evening, May 2nd, continuing every Monday of May, June, and July.

A course of thirteen lectures on PHARMACY, by Mr. B. S. PROCTOR ; commencing Thursday evening, 5th of May, and continuing each Thursday in May, June, and July.

These lectures are announced to contain a general outline of Pharmacy, treated under the following heads :—General arrangements : shop, store-rooms, and laboratory. Details of the apparatus and machinery used in the laboratory, and of the operations performed with them. Drying closet, boilers, stills, decoction, distillation, infusion, vaporization. Preparation of extracts by expression, percolation. Evaporation, over fire, by steam-heat, in vacuo, spontaneous. Alcoholic extracts, tinctures, relative merits of various processes. The press and processes of expression, furnaces, calcination, &c. Distillation of acids, of waters, and essential oils, preservation of essential oils, distillation of ether, evolution and absorption of ammonia, chlorine, carbonic acid, &c. Sublimation : sulphur, calomel, benzoic acid, &c. Filtration, despumation, &c. Comminution, by cutting, by contusion, by trituration, by grinding, by granulation, &c. Washing precipitates. Weighing, measuring, specific gravity. The Pharmacopœia: special notice of some of its processes and preparations. Dispensing, preparation of mixtures, pills, powders, liniments, ointments, plasters, &c. *The lectures will commence each evening at half-past seven punctually.*

These lectures, although they would admit of considerable extension to form a complete course of scientific instruction, comprise the most important practical details of the subjects referred to, and are quite sufficient to excite an interest in the mind of the student, with a desire for further information. The evidence of such disposition on the part of those for whose benefit the lectures are intended, would afford encouragement to enlarge the course of instruction to meet any demand that may arise. The School of Pharmacy at Bloomsbury Square was commenced in a similar manner. The original courses of lectures were on a moderate scale, by way of experiment, and were from time to time enlarged and extended with the advancement of the students. Mr. Brady, who is about to deliver the lectures on Botany at Newcastle, was a student in the School of Pharmacy in London.

The success of the school at Newcastle depends entirely on the young men. A numerous and attentive class of students would encourage and facilitate the enlargement of the means of instruction, the extent of which must of course be regulated by the demand. On the other hand, lecturers will not waste their time by addressing empty benches, nor will the employers of young men continue to contribute to the support of a School of Pharmacy if they find that their as-

sistants and apprentices take advantage of the leave of absence granted for that purpose, but instead of attending the lectures, frequent other places of resort. The time of trial with an institution, a society, or a voluntary course of instruction, is after the first year. The charm of novelty may sustain it in healthy activity for a session, as the originators feel individually more or less responsible for the success of the project. But when this excitement has subsided, and a renewal of the same efforts and steady co-operation is required, the waverers are shaken off, and the sincerity of the real promoters of the movement is put to test, as the Cockneys at the Epping hunt on Easter Monday are unhorsed at the first fence, while those who ride in earnest clear all obstacles, and come in at the "take." The association at Newcastle has made a fair start, under favourable circumstances, and with every prospect of success; if it should fail to realize the sanguine expectations of its founders, the responsibility would rest on the young men, who would be the greatest sufferers from such result.

A FALSE WAY OF STATING THE TRUTH.

The value of any statistical report or return depends on the correct understanding and application of the terms employed. For example, in estimating the population of a country with reference to the supply of articles suitable for the food of man, it would be proper to include the entire population, regardless of sex or age. If, however, the object of the inquiry were to ascertain the amount of numerical strength available in case of invasion or the attack of an enemy, such return, if including women and children, would be fallacious, and without value. On the same principle, the Registrar-General's return of the number of "Druggists," or "Chemists and Druggists" in Great Britain is of no value whatever in reference to the calculation of the proportion of the entire body of *bonâ fide* Chemists and Druggists who are connected with the Pharmaceutical Society. Yet this return is on certain occasions appealed to unfairly—we might say dishonestly—by some who, having failed to join the Society when they were invited and urged to lend their aid in its establishment, find it convenient now to make it appear that "the grapes are sour." We have lately seen statements of this description prepared for the perusal of members of the House of Commons, with a view of advocating the claims of the entire body of Chemists and Druggists to be placed by Act of Parliament precisely on an equality with Pharmaceutical Chemists. It was asserted that the Pharmaceutical Society constituted a very small section of the body of Chemists, the proportion being between 2000 and 3000 to upwards of 12,000; that among those not belonging to the Society were many very intelligent, scientific Chemists, while a majority of the members had passed no examination, but were admitted merely by the payment of a guinea fee, although the Society now requires all future members to be examined. Such a statement would be very likely to mislead a person not conversant with the facts of the case, but when analyzed it is found to be entirely fallacious.

The Registrar-General's return of the total number of Druggists, or Chemists and Druggists, comprises the following classes:—

1. Some apothecaries who, keeping open shops, pass for Chemists and Druggists. 2. Pharmaceutical Chemists. 3. *Bonâ fide* Chemists and Druggists who have been regularly brought up to the business, and might have joined the Pharmaceutical Society, if they had been so inclined. 4. Grocers, oilmen, chandlers, hucksters, herbalists, and keepers of drug stalls in the markets, and any other persons who sell drugs or medicines and expose coloured show bottles

in their windows. 5. The assistants and apprentices of these several classes. For our present argument the only two of the above classes which can fairly come under consideration, are the second and the third, which comprise all the *bonâ fide* Chemists and Druggists, whether members or not. On several occasions, circulars have been issued by the Society to all the Chemists and Druggists in Great Britain, whose names and addresses could be ascertained. The first of these circulars was in the year 1841 or 1842, at the time the Society was founded, and the object was to induce all the trade, if possible, to unite. Another was issued about the date of the Charter; and again, when the Pharmacy Act was passed, a special invitation was extended to all the Chemists and Druggists in Great Britain. In directing the circulars, some of the leading wholesale Druggists and their travellers gave their assistance, duplicates were sent to some of the leading Chemists, in case of any accidental omissions, and others were addressed to the Chemist and Druggist of ——, in towns where no name was known. With all this laborious statistical inquiry, and the chance of two or more circulars being sent, in many instances, to the same person, the entire number of circulars that could be got rid of in this way did not amount to 7000, and taking into consideration the number wasted from being directed at random, the number of duplicates, which must have been considerable, and the number returned through the Dead Letter office, it was supposed, on a rough estimate, that the number entitled to be recognized as Chemists and Druggists did not exceed 5000, including some of rather humble pretensions, and a mixed character of business.

The mode in which the Pharmaceutical Society is described in the statement above referred to, is another fallacy, equally calculated to mislead. It is said that a large majority of the members have passed no examination, but were admitted on payment of a guinea, and in allusion to the number examined no mention is made of the classical and minor examinations, although, in swelling the number of Chemists and Druggists against the Society, all the assistants and apprentices are reckoned as units in the total. It is a very material fact, and one usually overlooked in these one-sided statements, that of the members of the Society who have not passed the regular examination, a large number were founders, and, having been members from the year 1842 of 1843, must have passed a very fair examination *by the public* during the many years they have been in business; and those who were admitted at the time of the passing of the Pharmacy Act were required to furnish certificates of qualification, and satisfactory evidence of having been regularly brought up and educated in the business. As early as the first year of the Society's existence, candidates were required to produce certificates of recommendation, and not a few have been rejected because the inquiries respecting their qualifications and claim to rank with Chemists and Druggists had not been satisfactory. It is, therefore, a wilful deception to insinuate that a majority of the members consist of "any persons who thought proper to call themselves Chemists and Druggists and pay a guinea." No precaution was omitted that could be contrived in the establishment of a voluntary association, for confining the admissions to the class of persons for whom it was designed, and who answered the description adopted in the form of the certificate as being "duly qualified and a desirable person for admission as a member."

During the discussion of these statistical delusions and fallacies, what the Society has done for the profession and the public is overlooked. This we need not recapitulate here, as our object is simply to counteract a very unfair and disingenuous line of proceeding on the part of some, who, if they had joined in the undertaking instead of adopting "*Cui bono?*" as their motto, would have enabled the Society to do much more.

The case would be more accurately exemplified by reference to the fable of the two boys with their apple-trees. One boy made a fence round his tree, budded and grafted it, dug and manured the ground, destroyed the weeds and insects, and regularly cultivated his tree. The other said "*Cui bono?*" "How many years am I to be at this trouble and expense, before I get any fruit?" and so he neglected his tree, which withered and died. His brother offered him a share in his tree, which had made some progress and showed signs of a good crop, on condition that he would from that time forward share the labour and expense of cultivation, but *Cui Bono* declined. A few years afterwards, however, seeing the tree loaded with fruit, he went privately to his father to ask him to interpose his authority to make his brother give him an equal share of the fruit. Being brothers, they ought to share alike. "Certainly," says the parent, "so you ought; I shall inquire into it." On inquiry he finds how the case stands, and when *Cui Bono* comes for his answer, his father tells him he has not a leg to stand upon, and he may as well use the dead stump of his own apple-tree as a walking-stick.

We believe the case we have described is the *exception* and not the rule, and that in general a good understanding and mutual confidence prevail between the members of the Society and those who have neglected the opportunity of joining it. Whenever any objectionable Bill is threatened in Parliament, the latter apply as a matter of course to the local secretaries, or write to the secretary in London, to inquire what steps the Society is about to take, in order that all may make common cause in self-defence. It is also well known that the protection of vested interests is a fundamental principle with the Society, and that in all the propositions or drafts of Bills which have emanated from Bloomsbury Square, it has been a primary proviso that all Chemists and Druggists in business at that date shall be exempted from any interference. It has also been proposed to give them the distinction of registration as a privileged class, which would place them in a recognized and improved position. It is, therefore, obvious that the entire body of Chemists and Druggists are interested in promoting the measures the Society is endeavouring to introduce, the effect of which would be to raise all, and to injure none. We believe this is generally understood to be the case, but it occasionally happens when the sections of a proposed Bill are under discussion before Parliament that a few of the "*cui bono*" gentlemen (like the owner of the dead apple-tree) think it a good opportunity to steal a march upon their more industrious brethren, and by means of unfair and garbled statements, endeavour to obtain free admission to the rank, status, and privileges of the Society on equal terms with the members who have borne the labour and expense of establishing and supporting it during many years. We should scarcely have thought it necessary or desirable to notice so trasparent an endeavour to take an unfair advantage; but it is well known that misrepresentations travel faster than the truth, and it is an old saying that "if you give a falsehood twenty-four hours start, you will not overtake it in twelve months, if at all."

EVIDENCE OF SOUNDNESS OF MIND.

Between a sound state of mind and absolute insanity there are so many degrees as well as varieties of disorder, that it is impossible to define the boundary line with anything like precision. The highest authorities often take opposite views of the same case, giving rise to a very lucrative branch of litigation, and it is an undoubted fact, that many persons are allowed to be at large who are

less sound in their minds than others who are confined as lunatics under medical certificate. Various abstract questions are continually discussed among medical authorities as to the power of self-control, and the amount of moral responsibility, the varieties of eccentricity bordering on madness, the liability to sudden impulse, the distinction between sound reasoning upon false premises (or delusions), and absurd and erroneous deductions from correct hypotheses, with other inconsistences between thought and action indicating infirmity of purpose, or inability to regulate the actions by the judgment. The plea of insanity is often brought forward in defence of criminals; sometimes the magnitude of the crime is held to be inconsistent with rationality—as in the case of the man who cut the throats of his wife and several children, and then attempted self-destruction—or the absence of motive and disregard of consequences may tend towards the same inference; for example, when some deluded wretch attempts to shoot an illustrious personage in a crowded thoroughfare. Recklessness in money matters may be carried to such an extreme as to give rise to a question, whether a man is capable of managing his own affairs; and instances of monomania founded on delusion or eccentricity on some particular subject are innumerable. Where such vagaries are unattended with danger to the individual or annoyance to the public, restraint or interference is not usually considered necessary, and the expression, "the man is mad," is frequently used to denote—not that he is absolutely insane and requiring a keeper—but simply that he is an odd, eccentric person, who takes his own line, regardless alike of the rules of logic or the usages of society. Observers of human nature occasionally discover fresh forms or phases of deviation from a normal and healthy state of mind, each case affording materials for interesting discussion, and sometimes for difference of opinion as to the class or sub-class to which it properly belongs, or even as to the broader question, whether it be anything more than a variety of eccentricity not coming within the precincts of unsound mind.

Our attention has of late been forcibly directed to one of these obscure cases. To avoid personalities, we may introduce the subject of this peculiar tendency under the name of "Paterfamilias," for he has a large family of children. On most subjects he is not only perfectly rational, but endowed with superior intellect; he has, however, this peculiar whim or crotchet, that he allows his children to play with fire-arms, daggers, knives, gunpowder, and all kinds of combustibles, without any restriction whatever. His friends are continually remonstrating with him on the danger of such proceedings, which he freely admits, but says he is about to introduce some regulations by way of precaution. Many serious accidents have occurred, arising in most instances from the incautious use of these dangerous instruments and materials, by some of the younger children, who know nothing about their nature and properties. The older members of the family who are duly qualified for such practice, complain that whenever mischief arises from the clumsiness or ignorance of the younger children, the entire family shares the disgrace, and all are alike threatened with some vexatious and degrading punishment. They offer to instruct the younger children, and to ascertain which of them may safely be trusted. Paterfamilias admits the truth of all they advance, he gives them credit for their proposition, but, instead of availing himself of it, he consults some persons who know nothing about the subject except what they have read in books. By the aid of these persons he proposes a series of regulations to meet the urgency of the case. While this scheme is under consideration, his medical advisers wait on him, as they have often done before, in the hope of directing his mind to a rational view of the question. He unfolds to them his plan. All fire-arms, dangerous weapons, and combustibles, are to be kept in a closet under lock and key; everything is to be labelled in capital letters DANGEROUS; fulminating mercury, gunpowder, and other com-

bustibles are to be kept in bottles of a particular shape ; gunpowder is to be served out moist, unless, according to the statement of the applicant, it would not answer his purpose moist, and in that case he may have it dry, provided he will take not less than ten times the quantity he requires for use. A book is to be kept to register every instrument or substance delivered out of the dangerous closet, with the name of the party receiving it, the purpose for which required, &c. Appended to the regulations, and posted on the door of tne closet, is a long list of dangerous weapons and combustibles, many of which some of the younger children never heard of before, and therefore never asked for. All, however, are to be equally accessible, subject to the same conditions. M.D. inquires, "Are we to understand that subject to these regulations you allow all the children unlimited access to the contents of the closet?" "Certainly." "What are the ages of the children having charge of the closet?" "Three years and upwards." "Can they all read and write?" "Most of them; others can make a mark, or a witness can sign the book." "And do they know anything at all of the nature of the instruments and substances in the closet?" "On that point I never trouble myself to inquire, everything is to be properly labelled, and entered in the book; some of the boys, I know, are very skilful: one can throw knives like the Chinese juggler, another will hit the bull's-eye three times out of four with a revolver, and several are adepts at fireworks." "And do you allow all the children to play at these games ?" "Certainly ; I make no distinction ; all I have to do is to take care that the regulations are enforced, and the penalties in case of any infraction are remarkably heavy, in fact, ruinous." "And do you seriously consider it safe to trust children with such dangerous weapons and materials under any regulations whatever ?" "Well, I confess it is not safe." "Then why do you not prohibit access to the dangerous closet except to those who may safely be trusted?" "There never has been any such restriction." "And there has been frequent mischief for want of it." "I know it: perhaps I may attend to that suggestion some day ; in the mean time, I shall try the new regulations."

The Physicians, on retiring to consult, have a little conversation after this interview.

"What a sad case!" "Very!—and so rational, indeed talented on other subjects, yet on this crotchet his mind seems totally mystified." "And yet he admits all our arguments, he is fully aware of the danger, he has the remedy in his own hands, and he knows how to put it in force, yet he does nothing, and at this moment those children are amusing themselves with the most dangerous playthings without any restraint whatever."

This may at first sight appear to be an exaggerated case, but it is not. Paterfamilias may be found at the *Treasury* or in the *Home Office*. For dangerous weapons and combustibles read *poisons;* for gunpowder read *arsenic;* for children of three years old and upwards read the public, of whom a large proportion are no more fit to be trusted with the sale of poisons than a child of three years old. Then read the Sale of Poisons Bill in several of the forms in which it has been brought forward, and it will be seen that the parallel we have drawn is no exaggeration.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

AT A MEETING OF THE COUNCIL, *6th April*, 1859,

Present—Messrs. Bell, Bird, Bottle, Brew, Bucklee, Davenport, Deane, Meggeson, Morson, Peacock, Sandford, Squire, Standring, and Waugh, the following were elected

MEMBERS.

BURY ST. EDMUNDS .....Banfield, Harold
CHELTENHAM.....Glass, John T.
EDINBURGH .....Logan, Richard
LONDON .....Howden, Robert
" .....Kendall, John Fisher
" .....Rowson, Henry
" .....Wright, George Henry
STROOD .....Picnot, Charles

EXAMINATION IN EDINBURGH, *April 13th.*

MAJOR EXAMINATION.

Crossby, Joseph Parker.....Bakewell
Hallaway, John .....Carlisle

MINOR EXAMINATION.

Young, John.....Musselburgh

REGISTERED APPRENTICE.

NAME.	RESIDING WITH	ADDRESS.
Robertson, Archibald G.....	Messrs. Macfarlan & Co.....	Edinburgh

EXAMINATIONS IN LONDON, *April 19th.*

MAJOR EXAMINATION.

Baldock, John Henry.....London
Pettifer, Edmund Henry.....Towcester

MINOR EXAMINATION.

Baker, Alfred Philip.....Cosham
Benger, Frederic Baden.....Harlow
Cook, William.....Grantham
Fleetwood, Thomas.....Stratford-on-Avon
Paris, Thomas .....Salisbury
Simpson, Henry David.....Louth
Street, Edward.....Salisbury

REGISTERED APPRENTICES.

NAMES.	RESIDING WITH.	ADDRESS.
Bamber, John Kelway.....	Messrs. Savory & Moore...	London
Bourdas, John	Mr. Bourdas	London
Hatchett, Thomas.....	Mr. Hemingway	London
Holmes, John Thomas.....	Mr. Botham.....	Manchester
Isherwood, James.....	Mr. Greenwell.....	London
Pasmore, Frederick Richard....	Mr. Pasmore	London
Postans, Arthur William	Mr. Banfield	Bury St. Edmunds
Rochford, Percy	Mr. Burden.....	London
Savage, George Henry.....	Mr. Savage	Brighton
Scruby, William Yull.....	Mr. Pertwee.....	Romford
Simpson, Arthur Lankester.....	Mr. Simpson	Stowmarket
Smith, George Henry.....	Mr. Tonge	York
Walker, William.....	Mr. Headley.....	Bridlington Quay
Webster, George Otley.....	Mr. Seddon.....	Manchester

PHARMACEUTICAL MEETING.

Wednesday, April 6th, 1859.

MR. STANDRING, OF MANCHESTER, IN THE CHAIR.

The following

DONATIONS TO THE LIBRARY AND MUSEUM

were announced:—

On the Metrical System of Weights and Measures, by the Rev. J. S. Porter, from the Author.

Revue Pharmaceutique for 1858, by M. Dorvault, from the Author.

Proceedings of the Medical and Chirurgical Society, from the Society.

Journal of the Society of Arts, from the Society.

Photographic Journal, from the Photographic Society.

Journal of the Botanical Society of France, from the Society.

Assurance Magazine, from the Society of Actuaries.

Specimen of *Polyporus fomentarius*, from Mr. D. Hanbury.

Collection of about 300 specimens of articles of the Materia Medica, belonging to the late Dr. Robert Brown, from J. J. Bennett, Esq.

Specimen of crystallized acetate of lead, from Mr. A. Bird.

SOME OBSERVATIONS ON THE NEW RESIN OF SCAMMONY.

BY MR. A. F. HASELDEN.

I have to regret my inability to be present at the Pharmaceutical Meeting of February the 3rd last, when the subject of the new process for the preparation of resin of scammony was brought forward. My first impression, when the resin of scammony was commercially introduced to my notice, before the meeting took place, or the result became known through the Journal, was that the resin must necessarily be stronger than virgin scammony, as the best and highest priced article that can be procured always contains a certain amount of adulteration or unavoidable mixture of inert matter. From memoranda made some time since upon the examination of several specimens of scammony obtained from different sources, I find there was present from 16 to 22 per cent. of inert substances in the so-called virgin scammony, and in the other samples as much as 38 per cent. It may here be observed that one sample of a particularly strong caseous or cheesy odour contained the smallest amount of resin, indicating that the peculiar smell was no proof of purity or good quality. Upon the calculation that virgin scammony contains 20 per cent. upon an average of inert matter, every dose of ten grains of the resin must necessarily contain one-fifth more of the purgative portion, and should consequently be so much more active, unless we yield to the theory that beyond the full dose a few grains more can only produce the results of a full dose. The greater activity of the resin over virgin scammony appears to be in some measure substantiated by the experiments made by Dr. George Johnson. This difference of strength might possibly be found of little importance in the compound preparations into which scammony enters, but it may be worthy of notice, where it is prescribed simply in combination with calomel, a favourite dose for children, and before giving it a decided position as a substitute for virgin scammony, the profession should be fully and clearly informed in the most public manner of the exact difference between the two articles, so that any one giving a preference to the resin on account of its supposed infallibility as to adulteration and uniformity of strength, should know precisely the true value of it. There is, I may observe, a considerable difference in the appearance of the two when powdered, the resin being browner, somewhat resembling powdered jalap, whilst the virgin is more of a slaty or powdered fullers' earth colour.

I may perhaps venture to suggest that *pure* resin of scammony is not, perhaps,

the most appropriate name—the *pure* resin being white, whereas this preparation is brown. It might, I think, more properly be called simple resin of scammony, or resinous extract of scammony. The advantages of uniformity in so valuable an agent as scammony cannot be over estimated; but, I have spoken of the infallibility of it in regard to adulteration, as supposed, because I can see no greater barrier to its adulteration after it has left the hands of the patentee than to any other preparation of scammony, the facility of detection by testing in the one case will not apply with greater force than it has hitherto in the other; however much it is to be regretted, it is nevertheless a fact, patent to every one, that, where price and profit are objects of consideration, adulteration will, in spite of every effort to prevent it, gradually and artfully creep in. It is also remarkable, that most writers in mentioning scammony, speak of the large amount of adulteration practised, and further state that it is done expressly for the English market. It reminds one of a similar fact with respect to foreign wines, especially those of Spain and Portugal. After describing the usual process of manufacture, writers generally finish by stating it is then flavoured to suit the foreign markets. The resinous substances spoken of as most likely to form an adulterating agent with this resin of scammony, are those of guaiacum, jalap, and the fir. Now, the detection of guaiacum is easy and simple. In the first place, the application of a spirituous solution of the suspected resin to freshly-prepared wheat gluten, gives a greenish-blue colour; secondly, by subjecting paper moistened with the same solution to the fumes of nitrous acid, a strongly developed greenish-blue will be produced; and again, if a freshly-sliced potato be treated near the outer integument, a decided blue colour is obtained if guaiacum be present, which cannot be effected by either of the resins of scammony, jalap, or the fir.

It is, I think, barely probable that the resin of jalap would be used as an adulterating adjunct; for as jalap yields only an average of 16 per cent. of resinous to something like 50 per cent. of aqueous extractive, it would be too costly, the resin of jalap being quite as expensive as that of scammony—unless, indeed, the whole of the extract, aqueous and alcoholic, was employed. In this case detection would be easy, by the application of oil of turpentine. Both the resin and extract would be found insoluble, whereas the resin of scammony would dissolve readily.

Although apparently digressing, I may perhaps be permitted to notice that whilst the London College orders both spirit and water in making extract of jalap, the Edinburgh simply directs the employment of spirit; the product from the London form being resin and extractive, whilst that of the Edinburgh is simply resin. If, then, the resinous be the purgative portion, the Edinburgh extract or resin is about four times the strength of the London. The Dublin College omitted the preparation altogether in their last Pharmacopœia.

The next possible adulterating substance mentioned is the resin of the fir or common resin, which may be made to unite with resin of scammony in almost any proportion. In this instance, a good nose would appear to be the best auxiliary in detecting the fraud, for although in a spirituous solution of the combination the odour of resin is scarcely, if at all, perceptible, upon the addition of mucilage and water it becomes clearly distinguishable. Again, if a portion of the suspected resin be burnt, the peculiar smell of resin is very perceptible, and it is remarkable that a clear spirituous solution of resin of scammony becomes turbid upon the addition of an equally clear solution of common resin. This does not occur when the alcoholic solutions of resin of guaiacum and resin of scammony are combined. Having examined the new resin of scammony, I can find no trace of any of the substances mentioned. It has 97 parts of resin soluble in alcohol, 1 part of extractive soluble in water, and 2 parts of carbonaceous matter in 100. When decolorized, it yielded 90 per cent. of pure resin.

I have, therefore, come to this conclusion: that whilst the preparation of the resin of scammony remains in the hands of the present patentee, with equal care bestowed in the manipulation, there will be no fear of any improper admixture upon his part; but it is possible that a new patentee may spring up with an improved method, a saving in cost of manufacture, a reduction in price, and a diminution in quality. It is therefore essential that we should be informed upon every point connected with it, and ready to examine every sample, although to that man who would not scruple to purchase an article at a price below that which his own common sense would tell him was much less than the market price, all the tests that science, labour, or research could place at his disposal would only be so many silent witnesses of his ignorance or want of honesty. In what I have advanced there is no reason why a good resin of scammony, at a fair price, should not be received as a boon, and used accordingly, with a just appreciation of its merits, but, on the contrary, strong motives for encouraging the continued operations of the manufacturer. But one word more. With respect to the adulteration of this and every other article, the best safeguard on the part of the vendor must consist in raising the mind above it, by sound educational principles, making it as much an act of dishonesty to supply a false commodity, as to put one's hand into a neighbour's pocket, abstracting therefrom the contents, at the same time coolly staring him in the face; and, on the other hand, that the public should have such a regard for care, accuracy, and quality in the preparation of their medicines, so as not to look too narrowly at what may be considered a fair remunerating price.

Permit me now to draw your attention to what I am sure must have been an unintentional misstatement upon the part of our President when speaking of the Spiritus Ammoniæ Aromaticus of the Pharmacopœia. He observes: "Hence the Pharmacopœia preparation is gradually superseded, and remains neglected on the shelf, becoming a shade browner and a trifle weaker month after month, until it is rejected altogether as unfit for use." For many years I have never dispensed a prescription containing Sp. A. A. with any other than the Pharmacopœia preparation, a separate bottle being kept for that purpose in the dispensing department, and I am inclined to believe that such is the case in many other establishments, and I have never known, as far as my memory serves me, any inconvenience in dispensing caused by the acquired colour; and now, as there are always two sides to a question, I beg to say "Audi alteram partem."

Nothing can be more just than the observations respecting the discrepancies in the preparation known familiarly as spirit of sal volatile, almost every manufacturer of the article appearing to follow the example of the three Colleges in producing a compound, if identical in colour, differing in strength and flavour. As a domestic, and I may even venture to say, as a familiar spirit or remedy, the preference is given assuredly to the brightest, strongest, and pleasantest; and thus some Pharmaceutists, who have paid an unusual amount of attention in the production of a superior and uniform article, enjoy a greater share of public patronage. Every one by care and attention may obtain uniformity in strength, and by avoiding any aromatic likely to impart colour, especially cloves, brightness may be guaranteed; as a flavouring, few things are so well adapted or so generally liked as good essence of lemon, and I can see little or no difficulty which the framers of the Pharmacopœia may not now overcome, having, as they appear to have done, sought the assistance of practical men.

With respect to the employment of gum myrrh in lump instead of powder, experience gives a decided preference to the lump for mist. ferri comp.; as in the process of drying, in order to obtain a fine powder, a large amount of the fine aroma is lost; neither does it make so good an emulsion; this may probably be due to the fact that the finest pieces are not usually selected for powdering.

18, *Conduit Street*, 14*th March*, 1859.

REMARKS ON RESIN OF SCAMMONY AND SOME PREPARATIONS OF THE PHARMACOPŒIA.

BY MR. THOMAS SOUTHALL.

Resin of Scammony.—I have been much interested in the Paper on Scammony, in the last Journal. The introduction of a pure resin of scammony, prepared in this country from the dried roots, may be regarded somewhat as an era in the annals of medicine, when we consider that the process by which it has hitherto been made has probably undergone no change, or at least, no improvement, during the thousands of years which have witnessed its annual production in Asia Minor.

It is, I think, an extraordinary circumstance, that the dried root has not before been an article of commerce, and obtained a place in our Materia Medica. It is so nearly allied to jalap, both in its medicinal effect and in its botanical character, that the query naturally arises why, like jalap, it has not been used in powder? There may, possibly, be reasons to prevent its use in this simple form, but if there are none known or obvious to those who have seen the root, I would suggest its trial in this form.

The patent scammony is, as far as I can judge, a satisfactory article. In its taste, and the manner in which it affects the fauces and adheres to the teeth, it resembles resin of scammony otherwise obtained. Its fault, if any, is in its colour, which is much darker than resin of scammony commonly is. The difference may be owing to the patented article being prepared from the dried root, but if the colour could be improved by any alteration in the process, an objection which some may have to its present aspect would be removed.

The discussion of this subject has led to an inquiry in my own mind, whether an improvement somewhat analogous to that in the process for procuring scammony, might not be made in that for obtaining morphia, and I therefore suggest to manufacturers, that it might answer their purpose to prepare the alkaloids of the poppy from the green capsule, either in England or in opium-producing countries. A somewhat larger amount of the active principles of the poppy must exist in the capsule at the time the incision is made in it, than is to be found in the exuded juice, and by extracting it direct from the capsule, the vast amount of labour employed in collecting the opium would be saved.

Spiritus Ammoniæ Aromaticus.—The observations of Jacob Bell on the formula for Spiritus Ammoniæ Aromaticus, induce me to offer a few remarks on the peculiar qualities of the preparation which appear to me to be required to meet the public demand.

Spirit. Ammon. Arom. made by the formula in the London Pharmacopœia is probably as good a medicine for internal use as could be devised, but its tendency to change in colour leads to endless difficulties, and experience proves that authority becomes a dead letter when the public have palpable cause for dissatisfaction. In addition to its tendency to become coloured, the London preparation is very deficient in its pungent qualities, and the article required by the public is one in which efficacy as a medicine for internal use and pungency are combined. The former quality is obtained by using carbonate of ammonia as the basis, but the latter is aided by the presence of free ammonia. Experience also proves that a fine pungent aromatic cannot be obtained in perfection where a large proportion of water, like that ordered by the London College, is used as a menstruum, and good sal volatile must therefore be more spirituous.

It may be said that the mere question of pungency is not one that need be considered by the framers of the Pharmacopœia. The principal point which I advocate—viz. the use of both sesquicarbonate and free ammonia—may be supported on another ground. The Edinburgh College directs free ammonia to be used, while that recommended by the London and Dublin Colleges is chiefly sesquicarbonate; and in establishing a British Pharmacopœia it could hardly be

considered unreasonable to introduce a preparation in which the ingredients recommended by the three learned bodies are combined.

To enter into particulars of any formula might be considered as an attempt to put forward our own preparation. I will, therefore, content myself with stating that, in the opinion of the writer, Spirit. Ammoniæ Arom. should be highly spirituous—should be *saturated* with sesquicarbonate of ammonia, and should contain as much free ammonia as is needful to give it the required pungency. It should be *distilled* in combination with its aromatics, in the choice of which such should be avoided as would give rise to a change of colour in the product by keeping.

Such a preparation would, I believe, meet the public demand.

Note.—"The spirit used as a menstruum in making Spiritus Ammoniæ Aromaticus should not be weaker than in the proportion of one part of water to six parts of rectified spirit. Some water is necessary, in order to hold the carbonate of ammonia in solution."

Pilula Colocynthidis Composita.—Feeling much interested in what passes at the meetings of the Pharmaceutical Society respecting the formulæ of the Pharmacopœia, with reference to their continuance in the present form or otherwise in the forthcoming one, I venture to call attention to some remarks of Jacob Bell upon that of Pilula Colocynthidis Composita, which he describes as being wastefully expensive in the process employed, and generally considered to be griping and uncertain in its operation. I cannot see how it can be open to either of these objections, since the only alteration which was made in the formula of 1851 was the substitution of water for spirit in extracting the virtues of the colocynth and the substitution of soft instead of hard soap.

The method of preparing the simple Extract of Colocynth, introduced in 1851, is, I think, the perfection of simplicity and cheapness if sufficient water is used. The extract appears to contain all the virtues of the pulp in a concentrated form, and the process answers exceedingly well on the large scale.

I should, therefore, be sorry to see any change as regards this ingredient of the preparation, excepting that its proportion to the other ingredients might be more uniform if it were reduced to dryness and a proportionably smaller quantity.

Having been disappointed in my expectation that a potass soap would preserve the mass from becoming hard, I should be glad to see the use of hard soap restored, and the name of extract also. Physicians who have the responsibility of determining the nomenclature and formulæ of the Pharmacopœia have probably little conception of the inconvenience and perplexity which is brought upon dispensers of medicines by changes in the name of long-established preparations, which particularly applies in the case of old prescriptions and those that travel to a distance from the prescriber. I do not know that Druggists should expect the sympathy of Physicians in these cases, as old prescriptions do not pay fees, but since it cannot be denied that the public has a right to have such prescriptions prepared, changes which are not founded on some obvious advantage, and which only serve to perplex, may suggest the propriety of a liberal element being introduced into the councils of Pharmacopœia makers. The attempt, in 1851, to change the name of the Extract Coloc. Co., for it has certainly been only an attempt, has produced a result similar to what would occur if a well-known "Samuel" were to attempt to adopt the name of "Joseph." The change would be found highly inconvenient if not impracticable, particularly if Samuel had a neighbour Joseph with the same surname, who was very much like him in person.

Syrupus Papaveris.—I will add a few words respecting the formula for Syrupus Papaveris, which, in my opinion, is too strong to be safe. Several alarming cases of illness in children have come to my knowledge from its use, where there was no reason to suppose an unusually large dose had been given.

Poppy capsules yield about one-fourth, or 25 per cent. of extract, of pill consistence. Taking this as a standard, every fluid ounce of the syrup is found to contain about a drachm of extract, and yet Dr. A. T. Thompson says, "One fluid ounce contains about one grain of extract." Again, Dr. T. says, "The dose is from f℥j. to f℥j., according to the age of the patient." That is 7½ grains of extract for an infant, 30 grains for a child ten years of age, and 60 grains for an adult.

Dr. Christison says the dose is "Unc. ss. ad unc. ji.," to which I may add !!!

I have copied from the *Pharmacopœia Universalis* the several proportions of poppy capsules to that of sugar, directed to be used in Foreign Pharmacopœias, and find that in no case is it so large as in the London formula.

I therefore suggest that in the forthcoming British Pharmacopœia the proportion of poppy capsule should be reduced about one-third.

	Poppy Capsules.	Sugar.
London	3 parts	5 parts
Bruns. Palat. Wertem.	8 "	36 "
Spielmann	8 "	48 "
Generale	1 "	4 "
Ferrarensis	1 "	4 "
Gallica	1 "	4 "
Belgica	1 "	4 "
Herbipolitana	8 "	30 "
Van Mons	1 "	6 "
Swediaur	2 "	4 "
Amstelodamensis	1 "	3 "
Hyspana	16 "	48 "
Batava	1 "	3 "
Lusitana	2 "	4 "
Genevensis	2 "	4 "
Fuldense	1 "	2 "
Ant.	2 "	8 "
Danica	14 "	48 "

Mr. Morson said the suggestion of Mr. Southall with reference to the extraction of morphia from the capsule of the poppy seemed to follow very naturally from what had been done with reference to scammony. The opinion appeared to have been very generally entertained that the exudation from a wounded plant was similar to an extract obtained from the same plant. This opinion, however, was not supported by the results of experiments. Endeavours had repeatedly been made to obtain morphia by operating directly upon the capsule of the poppy, but all such attempts had failed to afford any practically available results. There was a wide field for investigation, hitherto but little explored, with reference to the production of those active principles in plants, some of which, such as morphia, formed valuable medicines. The poppy seed contained not a trace of the narcotic alkaloid, neither did the young plant which springs from the seed. As the plant came to maturity, however, it was found to contain, first, meconic acid, and afterwards morphia, but in very minute quantities. The ripe capsule was narcotic, but it would not, he believed, yield morphia in any quantity that would make it worth extracting. There was something in the living organism of the plant which caused the wounded capsule to exude a matter rich in the narcotic alkaloid, and differing essentially from any extract that could be made from the capsule. It was much the same with the lettuce, the exudation from the wounded stem of which was very different from extract of lettuce. With regard to the new process for obtaining resin of scammony, it remained to be seen how far it possessed advantages over the old process. He thought one effect of its introduction would be to cause virgin scammony to be imported at a lower price than heretofore.

The Chairman thought it desirable that some opinion should be expressed with reference to the propriety of using the new resin of scammony in the place of ordinary commercial scammony in dispensing.

Mr. Waugh did not think the substitution of the patented resin of scammony for the scammony ordered in the Pharmacopœia would be justifiable. The new preparation had not been sufficiently tried to enable them to say that its action was the same as that which they had been accustomed to. It was recommended as a pure article, and no doubt at present it was so, but they had no security that it would not become as much adulterated as the other when it found its way freely into commerce.

Mr. Bentley said that he considered the present paper as very useful and practical, for if scammony resin came much into use, it would soon be liable to adulteration in the same way as was now found with ordinary scammony. He did not fear its adulteration so long as its preparation remained in its present hands, but he was afraid of its being so when it became generally sold, which must be the case in a few years, if the use of it became general. In regard to the tests alluded to by Mr. Haselden, Mr. Bentley said, that although not brought forward as new, still they could not be too much known to the Pharmaceutical Chemist, and hence the importance of introducing such a subject at the present meeting. Mr. Bentley remarked that the gluten test for guaiacum was, he thought, a very unsatisfactory one, but there was an extremely delicate test for that substance, namely, hypochlorite of soda, which had not been alluded to; this he had found would detect guaiacum if only present in scammony resin in the proportion of $\frac{1}{300}$th part, and he believed that it would do so even in a less proportion. Mr. Bentley thought it very desirable to canvass at the meetings the subject of the new mode of preparing scammony resin, as it was very desirable to have a preparation of scammony of a definite strength.

Mr. Waugh recollected that some time ago a specimen of very pure virgin scammony was exhibited at one of their meetings, accompanied by a paper on scammony by Mr. Maltass, from which it appeared that that very pure preparation was taken in Turkey in doses of half a drachm. If that statement were correct, it might be inferred that the strength of scammony did not increase in proportion to its purity, but, on the contrary, that ordinary commercial scammony was stronger than the pure resin obtained as the specimen was to which he had referred. He did not think the reports of the medical gentlemen, which were read at a former meeting, were at all conclusive with regard to the strength of the new resin of scammony.

Dr. Redwood agreed in opinion with those who thought that the new resin of scammony ought not, without much more evidence than at present existed, to be substituted either for commercial scammony or for the resin prepared from commercial scammony. It was essentially different from the former, and was not yet fully proved to be identical with the latter. Even should it be found, however, that it differed from the resin prepared from commercial scammony, it might possibly prove to be a better preparation. A more lengthened trial was, no doubt, required before it could have its proper place assigned to it in the Materia Medica. He thought the right course would be to try it on its own merits; not to claim for it, without ample proof, the character of a true representative of any preparation of scammony hitherto used, nor to discredit it simply because it might be found to differ from such. There were several points which had to be considered with reference to this new resin of scammony. The remarks which had been made by Mr. Morson were very interesting and very important. Did the exudation from a wounded plant necessarily contain the same proximate constituents as were contained in the juices of the plant previously to its being wounded? Thus, were all the constituents of opium present in the poppy capsule before the incisions were made from which the opium exuded? He was not aware that this question had been fully investigated, and

it seemed to offer a field for important research. At first sight it was natural to conclude that the opium which exuded must have previously existed in the juices of the capsule. It had not been found, however, that the capsule, after being removed from the plant, yielded any product resembling opium. Was the opium, then, a mere inspissated juice, or was it not a secretion of a specific character, caused by a wound, and containing proximate constituents peculiar to itself? There appeared to him to be nothing in this latter supposition inconsistent with facts that were observed in nature. Thus, in the animal economy it was found that a wound in the skin caused a secretion of matter which did not previously exist in the circulation. This secretion only continued from any part of the body, from the finger, for instance, while it remained attached to the living body. If a corresponding part, while in a healthy state, were separated from the body, nothing equivalent to the secretion referred to would be obtained from it. So, in like manner, the wounded capsule of the poppy, while it remained attached to the living plant, exuded a substance, which, in the inspissated state, constituted opium; but would another capsule, unwounded, if removed from the same plant so that the vital function should have ceased, yield either juice or extract resembling opium in its composition? He believed that it would not. And what was thus said of the poppy might also be said of the lettuce, which yielded lactucarium by incision, and to some extent it may probably be also said of the scammony plant. It was not, therefore, to be accepted as by any means certain that the scammony root, after being removed from the ground and operated upon as a defunct organ, would yield products identical with those obtained by incision into the still living plant. He did not say that the new resin of scammony prepared from the dead and dried root did differ essentially from the resin obtained as heretofore from the exudation of the living plant; he merely wished to guard against jumping to conclusions, and to show that the new resin may differ in composition and properties from the old, inasmuch as they had not been proved to be identical. In doing this he was anxious not in any way to speak disparagingly of the new resin. He thought there were some points in its history which seemed to justify the expectation that it may at least be more uniform in composition and properties than any other preparation of scammony hitherto used. But something, he thought, had yet to be done towards the elucidation of the chemical composition and constitution of this new resin. The conditions under which commercial scammony was produced differed from those attending the production of the new resin, not only as regarded their separation from the root, but also as regarded their subsequent treatment, and this difference was not unlikely to affect the composition and properties of the resin. The exudation from the root, which in the dried state constituted commercial scammony, contained other principles besides the resin; and in the process of drying or curing which the liquid exudation was subjected to, it was probable that some fermentation occurred, of which there was evidence in the porous character of the dried masses. Now, from the most recent chemical investigations of scammony resin, it had been concluded that it is a conjugated compound of a resin with a species of sugar, being analogous in constitution to tannic acid, which is considered to be a conjugated compound of gallic acid and sugar. It was well known that tannic acid, when exposed to the air in the wet state in contact with other principles contained in the nut-gall, underwent a sort of fermentation in which the sugar was destroyed and gallic acid was set free. A similar reaction probably occurred when the resinous exudation of the scammony root underwent fermentation during its collection and inspissation. It by no means followed, therefore, that the new and the old resin of scammony were identical because they both came from the same root. Even admitting that the resin contained in the exudation from the wounded root, in the state in which it first issued from the plant, was the same as that extracted from the dried root

by means of spirit, the subsequent treatment of the two products may nevertheless cause them to differ as much as tannic acid differed from gallic acid.

Dr. Garrod thought the comparison which had been drawn between the results of making incisions into the skin of an animal and into the capsule of the poppy, would not serve to support the argument which had been founded upon it. On making an incision into the skin, the blood which flowed was identical with that which previously circulated in the veins, and it was not until some time afterwards that any diseased secretion occurred. The exudation obtained from the poppy, the lettuce, and the scammony-plant, by incisions made into different parts of them, immediately followed the formation of the wounds, and therefore appeared to correspond with the blood of a recent wound rather than with the secretion which appeared at a subsequent period. With regard to the new resin of scammony, he believed it consisted of the glucosate, to which reference had been made. This was not always the case with commercial scammony. It had been found that the resin contained in some samples of virgin scammony differed from that contained in other samples, sometimes being composed almost entirely of the resinous acids, at others containing a large percentage of glucosate. Dr. Garrod could state, however, from experience, that both the glucosate and acids were effectual as purgatives, and that, in fact, no difference could be detected between them by clinical observation.

PHARMACEUTICAL MEETING, EDINBURGH.

ON THE CHEMICAL COMPOSITION, USE, AND ACTION OF SHEEP-DIPPING MIXTURES;

With Special Reference to Experiments undertaken in connexion with the late wholesale Poisoning of Sheep at Burton, Northumberland.

Part I.—*The Chemistry*, by Dr. Stevenson Macadam, F.R.S.E., Lecturer on Chemistry in the Medical School, Surgeons' Hall, and School of Arts, Edinburgh.

Part II.—*The Physiology*, by Mr. John Gamgee, Professor of Veterinary Medicine and Surgery, New Veterinary College.

(*Concluded from page* 518.)

PART II.—BY MR. JOHN GAMGEE.

Arsenical baths have for long been the most highly valued preservatives of the fleece of sheep, which is so favourable to the protection and propagation of many parasites. Smearing stuffs, such as inferior kinds of butter, Gallipoli oil, and mixtures of various oils, have been advocated, sold, and used, to supersede those preparations which have occasionally proved destructive to the sheep, and others which, though used with impunity, are considered by some unsafe in the hands of the shepherds.

Mercurial preparations in the form of ointments are those especially to be dreaded. Arsenic is the poison the name of which seems to alarm a few; but the majority of sheep farmers and shepherds absolutely seek arsenical baths, and patronize the strongest as the most effectual, and their experience has for long impressed them with a sense of the safety of such baths when employed with due care.

The precautions which have especially been insisted on, and are universally known to farmers, are—1st. Keeping the sheep's head out of the bath. 2nd. Pressing the wool on drainers so as to allow the sheep to carry away as small a quantity as possible of the arsenical solution. 3rd. Allowing the sheep to drain on a large area, deprived of food.

With reference to pressing the wool, it is very carefully performed by many, though never to such an extent as to squeeze all out that might be removed from the body of the sheep. The dipping process being carried on usually in summer,

the sheep speedily dry, and in winter, too, if a dry wind prevail, the fleece is soon deprived of much moisture.

Experience has led to great attention being paid by farmers and shepherds to the process of dipping, and the precautionary measures especially adopted where the large numbers of sheep to dip render it indispensable to carry out a rigid system for the effectual and safe performance of the operation. In Australia, for example, arsenical baths are used most extensively. As fast as the animals are dipped, they are placed in pens by twos and threes. The pens are on land deprived of every particle of food, and the sheep are retained there till they thoroughly drain and dry. They are then removed on to very bare and extensive pasture, and in the event of showers, are replaced in the pens for a while.

As an indication of how generally it is known that arsenic is contained in sheep dips, and that proper precautions are usually taken to prevent poisoning, I may quote the words of William Colquhoun, Esq., of Luss, who, in his "Remarks on the Decrease of Grouse," referring to Benjamin Badaud's theory, that the cause of such decrease was heather tainted by sheep dip, says:—

"Any one practically acquainted with hill-farming and sheep-smearing, will of course laugh at such a notion as utterly preposterous; but there are many excellent sportsmen who know little of these farming operations.

"In the first place, it is a 'mare's nest' after all; for hill-sheep are not smeared with corrosive sublimate, arsenic, or any poisonous ingredients, as the advocates of this theory suppose, the slightest possible quantity of which, finding its way into the intestines of a grouse, would immediately deprive it of vitality altogether. On low ground, when any such poisonous wash is used, *the sheep are confined till their fleeces are thoroughly dry;* for if their pasture was in any degree tainted with it, they would themselves be the first to fall victims. But it soon dries, and when such precautions are taken, *it is found perfectly safe.*"

If sheep be scattered, as they should be, over an extensive surface immediately after being dipped, they will eat the grass which is no doubt charged with arsenical solution to a certain extent, but they fail to pick up sufficient to injure them. Sheep are, as a rule, preserved by the quickness with which they dry, and also the rapidity with which, in very damp weather, the arsenical solution is carried into the soil, adhering but slightly to the grass.

We shall afterwards see that arsenical baths are not directly injurious, and they cannot poison sheep provided the solution be not swallowed.

Not only have the arsenical dipping mixtures proved preventives to scabbies, but curative with sheep badly affected with scab; whereas it is remarkable, that in some animals, oxen especially, similar arsenical solutions have proved not only destructive to the parasites, but to the animals treated, from the tendency which oxen have to lick themselves, especially when, by the action of the arsenic, the excoriations of the skin heal, and, in cicatrizing, are attended with itching. Sheep, however, do not lick themselves or each other as cattle are wont to do, and if they do not object to poisoned grass, they certainly dislike masticating their fleece.

It is a remarkable fact that accidents should be so rare, considering the enormous amount of arsenic sold for dipping purposes. Gerlach, who is one of the veterinary authorities opposed to the use of arsenical baths, is opposed to them on the ground that they can be superseded, which I think is doubtful, and on the ground that danger is to be apprehended from the dissemination of arsenical solutions over farms, a common cause, he believes, of chronic poisoning in poultry, or any other animal whose food may thus accidentally be poisoned. Professor Himly supports this view, and in speaking of Schleswig-Holstein, he says that in these two duchies 5000 pounds of arsenic are annually consumed for the destruction of parasites of different kinds, and that such a quantity of poison cannot be disseminated about the country with impunity. Gerlach also says that men are placed in danger from scratches or excoriations on their arms and hands. I am not aware of a single instance of death in man from this cause. The injury seems localized in the skin, and if the human skin absorb more readily than that of the lower animals, how can we account for the immunity enjoyed by sheep dippers, whose arms are in arsenical solutions from morning to night—and sometimes for several days in succession—whereas often their bodies are steeped in the mixture, from the liquid splashing over their clothes, which become soaked, especially over the chest and belly. This

circumstance has led to cutaneous eruption on the anterior surface of the trunk, about the pubis and scrotum, but, nevertheless, arsenic has not been absorbed, at least, not to such an extent as to produce symptoms of poisoning.

Scabby sheep have often been destroyed by applications for the cure of scab, but, as I have stated above, the remedies have been applied incorporated with lard. Substances may thus be made to penetrate the system which would not be absorbed in the shape of watery solutions.

Accidents have, however, occasionally ensued from the use of arsenical baths for sheep. On the authority of some persons, the poison has been said to enter the system by absorption through the skin; but others declare, my experiments prove, and the widest experience of farmers and others substantiate, that sheep cannot be poisoned by immersion in arsenical solutions, and that deaths result from mismanagement of flocks after having been dipped.

Those persons who believe in the cutaneous absorption of arsenic have found themselves in the necessity of offering theories in proof and explanation of their views. They have spoken of the dipping mixtures as injurious, if too strong; and, on the other hand, that the bath may be very weak, and its absorption then rapid. In the next place, the arsenic or the alkali found in the bath have been accused of active causticity, leading to denudation of the skin. The cuticle being thus removed, the skin is supposed then to absorb the soluble salts of arsenic with great activity. Lastly, and this is the most extraordinary of all the theories, it has been declared, in connexion with the late trial, by a scientific witness, on the part of the pursuer, *that arsenic is a capricious poison, and occasionally it may be absorbed through the skin, whilst, at other times, it is not.*

We shall dispose of these various theories by direct proof, and show that what their originators believe to be facts and possibilities are mere hypotheses, founded on no experimental data. Evidence, morever, abounds to prove that the destruction of sheep after dipping, especially in the case of the sheep at Burton, is due to the grass becoming charged with arsenical solution, which is afterwards greedily devoured by the flock.

As Dr. Macadam has stated in the foregoing pages, a series of experiments were instituted by us, at the request of Mr. Elliot of Berwick, to prove whether arsenical baths were dangerous, and if sheep could be poisoned by immersion therein. Accordingly, on the 4th of January, 1859, I purchased ten pounds of white arsenic, five pounds of soda ash, and one pound of sulphur, which Dr. Macadam proved by analysis to be ordinary commercial specimens of arsenic, soda ash, and sulphur.

Experiment I.—On the 10th of January, 1859, at one o'clock p.m., I prepared the following bath:—

White arsenic	1¼ lb.
Soda ash	1¼ lb.
Sulphur	2 oz.
Soft soap	4 lbs.

These substances were mixed by active stirring in six gallons of boiling water, and hot and cold water were alternately added to make up a 35-gallon bath, at 100° Fahr.

A long-wooled Cheviot ram, ten months old, was placed in the bath at half-past two p.m., and removed at three o'clock p.m., when the arsenical water was roughly and imperfectly pressed from the wool. The ram was then placed loose in a stable.

A second ram of the same age and breed as the preceding one was immersed at five minutes past three, and removed at half-past three o'clock, and treated precisely as the last.*

Up to the present day, 23rd of March, both rams have continued to thrive, though placed at three different periods with recently dipped sheep—the subjects of the following experiments.

Experiment 2.—On the 1st of January, 1859, I received from Berwick, per Mr. Elliot's assistant, two packets labelled as follows:—

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* As a precaution, to avoid the possibility of these sheep drinking the arsenical water, both the rams had their heads covered with gutta percha bags, which were arranged so as to allow the animals to breathe. This was dispensed with in subsequent experiments.

"SUPERIOR BATH FOR SHEEP, PREPARED BY J. ELLIOT, CHEMIST AND DRUGGIST, Hide Hill, Berwick.

"Pour upon each packet 3 or 4 gallons of boiling water, and stir well for the space of ten minutes; add about 45 gallons of cold water, and dissolve in the mixture 4 pounds of soft soap; the preparation will then be completed, and the quantity sufficient to dip 50 hogs.

"The solution must be put into a tub or other vessel, sufficiently large to allow the sheep (EXCEPT THE HEAD) to be immersed in it without running over. When the sheep is taken out it must be placed in another vessel, and the liquid pressed from the wool, and returned again into the dipping vessel."

Each packet is stated to contain—

Arsenious acid	20 oz.
Soda ash	20 oz.
Sulphur	2 oz.

On the 15th of January, 1859, one of the above packets was added to five or six gallons of boiling water, the mixture being frequently stirred. Four pounds of soft soap were then mixed with it, and hot and cold water alternately added, to make up a 35-gallon bath at 100° Fahr.

Four sheep were used in this experiment, averaging in age two and three years old; they were of the black-faced breed; three of them wethers, and perfectly sound. The fourth, a ram, badly affected with scab; the back and right side of the body of this sheep, denuded of wool, and extensively excoriated, *might appear* an actively absorbing surface.

The three sound sheep were immersed in the bath for five minutes each—the one from 12.35 to 12.40, the second from 12.54 to 12.59, and the third from 1.6 to 1.11 p.m. The three were placed in a stable with much straw beneath them, being still very wet, though the dipping mixture had been pressed from the wool.

The fourth sheep—the one affected with scab—was placed in the bath at 2.48 p.m. and removed at 3.18 p.m., having been immersed for half an hour. The arsenical solution having been roughly pressed from the wool, this animal was placed with the other three.

January 16, 2 p.m.—The sheep were set free into the park at two o'clock on the 16th of January, being still very wet, but in perfect health; and on entering the field, they seemed playful, and possessing a keen appetite.

I again examined these sheep on the 21st, and found them in good condition, the scabby one recovering fast from the skin disease.

EXPERIMENT 3.—On Tuesday, the 25th of January, 1859, the following bath was prepared:—

White arsenic	3 lbs.
Soda ash	3 lbs.
Sulphur	4 oz.
Soft soap	4 lbs.

This mixture was dissolved in about 10 gallons of boiling water, and hot and cold water were added to make a 35-gallon bath, at a temperature of 100° Fahr.

Six black-faced sheep, averaging from two to three years of age, were the subjects of this experiment. Four of them were sound, and free from abrasions of the skin or hoofs. One, a ram, was badly affected with foot-rot, one of the hoofs being completely detached, and the vascular structures exposed and bleeding. Another wether was badly affected with scab, and the skin was the seat of an extensive eruption.

The four healthy sheep were immersed in the bath, one after the other, for five minutes. The tup affected with "rot" was dipped from 2.45 to 3.15, and the sheep affected with scab from 3.20 to 3.40. p.m. The whole of the animals, having had the arsenical wash slightly squeezed from the wool, were placed together in the stable until the afternoon of Wednesday, the 26th of January, when they were set free in a field to feed on grass and turnips, their wool being still very damp.

These sheep have continued in perfect health up to the present day, the diseased ones having been much benefited by the arsenical treatment they received on the 25th of January.

EXPERIMENT 4.—On the 4th of February, 1859, the following bath was prepared:—

White arsenic	½ lb.
Soda ash	½ lb.

Mixed with a few gallons of boiling water, and made up to 35 gallons at 100° Fahr.

Four sheep were operated upon in this experiment; three of which had served in experiment 2, and one in experiment 3.

No. 1—a wether—placed in the bath at 3.15 p.m., and taken out at 3.45 p.m., having thus been immersed half an hour; the wool was pressed, and the sheep placed in a stable.

No. 2—a tup—placed in bath at 3.50, and taken out at 4.20 p.m., and treated as the preceding one.

No. 3—a tup—placed in bath at 4.40, and taken out at 4.45 p.m.

No. 4, immersed at 4.56, was taken out at 5.1 p.m. The last two sheep being only bathed for five minutes, were placed with the two former ones after their wool had been squeezed.

These animals also continued unaffected in health.

Experiment 5.—On the 21st of February, I mixed—

White arsenic	1½ lb.
Soda ash	8 oz.
Sulphur	2 oz.

The above was dissolved in 7 or 8 gallons of boiling water, with 4 lbs. of soft soap, and the bath was made up to 35 gallons, at a blood-heat. Four sheep were employed for this experiment. One was the scabby one immersed for half an hour on the 15th of January, and the other two had been immersed for half an hour on the 4th of February; the fourth had been dipped on a previous occasion for five minutes.

Two of these sheep were dipped for five minutes, and two for half an hour, in the above-mentioned solution. Dr. Macadam was present when I dipped one for five minutes, and a second one for half an hour. The four sheep, after having been dipped, were driven from the Dean farm to the New Veterinary College—a distance of nearly two miles—and the sharp wind dried the sheep considerably. They were placed in a stable, and on the 22nd were still wet, when I procured urine from the two sheep which Dr. Macadam saw dipped, for the purpose of analysis, but arsenic failed to be detected in it. The sheep continued in excellent health.

Experiment 6.—On the evening of the 26th of February, in company with Mr. Wilkinson, Veterinary Surgeon, Newcastle, and Dr. Macadam, a bath was prepared, containing—

White arsenic	1¼ lb.
Soda ash	1¼ lb.
Sulphur	2 oz.
Soft soap	4 lbs.

Half the above quantity was dissolved in 22½ gallons of water, and two sheep were dipped in it for a few minutes. A quart-bottleful of the mixture was preserved. Rather more than three quarts of oats were placed in a towel, and soaked in the bath for several minutes. An oat sheaf was also dipped in the solution. The oats were spread out to dry. Two undipped sheep were enclosed in a shed with the oat sheaf; the two dipped ones were placed in the same shed, but separated from the above. On the morning of the 27th, Mr. Wilkinson observing that the oat sheaf had not been touched, and attributing this to the sheep having been shut up, and kept in the dark, quite contrary to their usual treatment, placed some fresh cabbage leaves, which the sheep had been accustomed to eat, about the shed; still they refused to take any food. Mr. Wilkinson then selected an enclosed piece of ground, about 23 by 24 yards, and watered a strip of grass, 23 yards in length by 3 in breadth, with the arsenical solution. A few minutes after the mixture had been placed on the grass, the sheep eat it freely, and though they had the range of considerable pasture beyond the poisoned parts, they especially remained on the latter. The oats that had been soaked the evening before, were now placed in a trough, and the sheep allowed near them. They ate them freely, and partook of more than their usual quantity during the day. I saw the sheep eating the poisoned grass and oats on the evening of the 27th, and on the morning of the 28th found them all affected with symptoms of arsenical poisoning, and giving evidence of great distress.

This experiment was instituted the evening of the first day of the trial at Newcastle, as it had been stated by witnesses for the prosecution that sheep would not eat food which had been soaked in an arsenical solution, charged with soda and soap.

In performing the various experiments here detailed, I have had occasion to retain my hands in the arsenical baths for periods varying from a few minutes to nearly

three hours, and never experienced the slightest inconvenience. Occasionally I had scratches on my hands, but the only effect resulting from the arsenical bath was a slight temporary smarting wherever the skin was wounded.

The conclusions which I draw from the foregoing experiments, are—

Firstly. That the immersion of sheep, *whether so und or suffering from scab with extensive eruption, or "foot rot," with free exposure of the vascular structure of the feet*, in arsenical solutions varying in strength, is unattended by prejudicial effects, and proves salutary to the diseased animals.

Secondly. That the congregation of sheep, after dipping, where food is not allowed them, is unattended with danger; and I can distinctly testify to the absence of all risk from sheep licking each other.

Thirdly. That all the sheep experimented upon having remained damp from 24 to 36 hours after being dipped, cutaneous absorption of arsenical solution might have been going on rapidly during the prolonged period that the sheep continued wet; but no unfavourable symptoms ensued, indeed the reverse.

Fourthly. The absence of the slightest change in health, or of the manifestation of symptoms which usually ensue on the administration of arsenic to the lower animals, even in medicinal doses by the mouth, leads me to infer, that if a minute quantity of arsenic, in solution, can penetrate the system of a sheep by absorption by the skin, it is quite insufficient to develop the physiological action of the compound.

Fifthly. A solution of arsenic is not more readily absorbed from limited abraded, surfaces than from the healthy skin, owing probably to the arsenic acting as an astringent on the sores, and rendering the latter as impermeable, *probably*, as the uninjured skin. This remark does not apply to large or deep wounds.

Sixthly. It appears *impossible to poison sheep by bathing them* in arsenical solutions, provided the liquid is not introduced *directly* or *indirectly* into the stomach by the mouth. By the *direct means of introduction* of the constituents of a "dipping mixture" in the stomach of a sheep, I mean making the sheep swallow the liquid whilst being bathed; and by the *indirect means* is implied the penetration of arsenical solution into the stomach on food poisoned by the liquid dropping from the bodies of sheep the wool of which has not been pressed, or from a number of sheep injudiciously congregated over food they subsequently eat.

Seventhly. Arsenical solutions, whether *weaker* than ordinary dipping mixtures, or *much stronger*, are likewise incapable of being absorbed by the skin of sheep or man.

Eighthly. Sheep will partake of grass and other food which has been smeared or soaked with an arsenical solution, notwithstanding the presence of soft soap and soda.

That the arsenites which have proved so useful and so harmless as preservatives of the fleeces of sheep do not enter the system by the skin in appreciable quantity is proved to demonstration, not only by the foregoing experiments, but by those of Mr. Dun, which are mentioned in the report of the trial. Moreover, we have the experience of many years, during which *millions* of sheep have been dipped with impunity.

Experiments on medicinal baths of different kinds have further proved that it is highly probable that medicinal agents in general cannot be introduced into the system of man or other animals through the medium of baths. Indeed, we can go a step further, and declare it as highly probable, if not absolutely proved, that a saline solution, such as that used in dipping sheep, excites diaphoresis, increases the exhalation from the skin, and sets up a process precisely the reverse of absorption—viz. that of abundant elimination by the skin.

In the last number of the *British and Foreign Medico-Chirurgical Review*, pages 135-147 are occúpied by an able article on the influence of baths on the excretions. At no time could that review have appeared more to the purpose than last January; and we subjoin an extract on the subject of medicinal baths, in which ascertained facts are brought out, which agree altogether with our own observations:—

"*Medicinal Baths.*—No one has yet investigated, to our knowledge, the quantitative influence on the excreta of *medicinal water baths.* Nasse states that a warm bath containing carbonate of potash increased the urinary flow to double; but as this effect is also produced by simple water, it does not follow that the carbonate of potash had any effect.

"It seems clear that very few, if any, medicinal substances are absorbed through the skin when applied in the form of baths. To refer only to recent experiments ;

Homolle could detect no trace of iodine after baths of iodide of potassium, or of cyanurets or hydrocyanic acid, after baths of ferrocyanide of potassium. He states, however, that potash increases in the urine after baths of carbonate of potash. The urinary chlorides were not increased, but the reverse, after a bath of chloride of sodium. Kletzinky* could not detect in the urine any of the following substances after bathing in solutions—iodide of potassium, ferrocyanide of potassium, sulphate of magnesia, borax, acetate of lead, nitric acid, sulphuret of potassium.

"Durian† could not detect the entrance of iodide of potassium, carbonate of potash, ferrocyanide of potassium, rock salt, nitre, alum, sulphate of magnesia, sulphate of quinine, infusion of digitalis, and infusion of belladonna.‡

"Braune§ could detect no iodine in the urine after foot-baths of iodide of potassium and of iodine, when the evaporation of iodine and absorption through the lungs were prevented by a layer of oil on the water of the bath.

"Although all these recent experiments agree in the fact that no absorption of these substances can be proved, it does not follow that no effect is produced on the urine. It is a curious fact that the acidity of the urine is often very much altered.

"Durand Fardel‖ found the urine to be alkaline during and after the use of the Vichy baths (bicarbonate of soda), and Musset has observed the same fact from the Plombières water.¶

"It might be supposed that this was owing to actual absorption of those alkaline waters; but the same fact was noticed by Homolle after baths of chloride of sodium, iodide of potassium, and ferrocyanide of potassium. The alkalinity was even sometimes greater than after an alkaline bath.

"Poulet has indeed noticed the production of alkaline urine after *acid baths*, so that we must look to some other cause, probably to some special action on the skin, rather than to absorption of alkali.

"The decrease of acidity (though not alkalinity) was noticed by Spengler** from the baths of Ems. Absolute alkalinity of the urine has been found by Durian after baths of iodide of potassium (200 grammes in cold and warm baths for two hours); of carbonate of soda (230 grammes); of carbonate of potash (230 grammes); of ferrocyanide of potassium, of chloride of sodium, of nitre, of sulphate of magnesia, alum, nitric acid (200 grammes in bath); sulphate of quinine and infusion of belladonna (2 lbs. of the leaves).

"On the other hand, sea bathing increases the acidity (Beneke), and so do also the Wiesbaden saline baths (Neubauer). The Oeynhausen baths produce little effect, but rather tend to increase the acidity than otherwise (L. Lehmann). The action of these natural baths contrasts, therefore, in this respect, with medicinal baths of chloride of sodium."

In drawing conclusions from the above, the learned reviewer tersely states, "The substances dissolved in the baths are not absorbed through the skin."

Colin mentions in his work on the *Physiology of the Domestic Animals*, that "the skin absorbs but feebly and slowly when its tissue is intact, and its epidermic covering is not destroyed. This structure may remain for long in contact with poisonous substances which have no chemical action upon it. *Arsenious acid of baths, in which sheep are immersed for whole hours, never induces phenomena of poisoning.*" In Colin's own language, "L'acide arsénieux des bains dans lesquelsson tient plongé les moutons pendant des heures entières ne détermine jamais de phénomènes d'empoisonnement."

Many hundreds of sheep have been destroyed, or seriously injured, by the use of mercurial ointment; and, to this day, the farmers in England employ the blue ointment for scab in sheep. When we mention the skin as resisting the absorption

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* Canstatt's *Jahresberichte* for 1853. Löshner's *Report on Mineral Waters*, p. 96.

† *Archives Gén.*, Fév. 1856.

‡ *Archiv. für path. Anat.*, Band xi. p. 295.

§ As noticed by Meissner, however, all these experiments were made at temperatures which Durian himself considers unfavourable for absorption.

‖ De l'alcalisation de l'urine, chez les malades au traitement thermal de Vichy.—*L'Union Méd.* 1853, Nos. 18—20.

¶ *L'Union Méd.* 1853, No. 34.

** *Ueber die Absorption in den Bädern zu Ems, Deutsche Klinik*, 1854, No. 22.

of medicinal or poisonous materials, we refer to these substances in solution, and not incorporated in the form of pastes or ointments. Any animal may be destroyed by an active arsenical paste, which may be rubbed in for the removal of tumours; whereas the same animal might be dipped in arsenical solution repeatedly, without in any way endangering its life.

The evidence for pursuer and defender at the Newcastle-on-Tyne assizes, respecting the sheep poisoning at Burton, is, independently of direct knowledge that solutions of arsenic will *not* be absorbed by the skin, sufficient to prove that the sheep died from the arsenic introduced into the alimentary canal after the process of dipping.

Therein it is stated that Mr. Black procured, last August, packages of Mr. Elliot's mixture for 750 sheep, used 14 out of 15 packages, each of which was prepared for 50 sheep, and with a dip for a flock of 700, 869 animals were bathed. Of these 850 died. The symptoms preceding death were unmistakably those of arsenical poison, introduced by small and repeated doses in the system. They were not the symptoms of poisoning by a single large dose of arsenic. The falling off of the wool in patches is sufficient to prove this.

Professor Dick examined the carcase of one of the sheep that died, and, after stating that he had formed an opinion as to the cause of death, he declares—

"Supposing the sheep in question had been submitted to my examination, and no account whatever had been given to me of the history of the sheep, I would have been able to form this judgment—that unless the arsenic had been poured over the throat, it must have been absorbed by the skin. Supposing the arsenic to have been in this case forced over their throats, I would expect to find the same appearances would take place whether the arsenic was absorbed by the skin, and put into circulation, or whether it was taken in by the mouth."

Dr. Murray Thomson analyzed the organs of the sheep. He found no trace of arsenic in the paunch, but he did in the walls of the second stomach; the third and fourth stomach and intestines *he did not examine*. He found it in the liver, and naturally enough on the skin, but not in other organs, such as the spleen.

The arsenic being found in the coats of the second stomach is no more than could be expected from, and indeed proof of, the introduction of the poisoned grass in the alimentary canal by the mouth. The second stomach or reticulum is especially prone to entangle within its peculiar folds and recesses any material which penetrates the viscus, and may bag in the dependent sac constituted by this viscus, attached, as it is, to the anterior part of the floor of the abdomen. We may refer our readers to No. II. of this Journal, at page 202, in which we have the description of a fistula of the reticulum produced from poisoning by arsenic. In that case the arsenic was in the solid form, but grass impregnated with arsenic would deposit the latter in the reticulum, where liquids are even rather abundant for its solution.

It was Dr. Maclagan who analyzed not only the organs of the sheep that had been poisoned, but the soil on which they had been, and the grass they had eaten; and he found the grass growing from the sods, as well as the sods, and the contents of the alimentary canal—*especially the cæcum*—contaminated with arsenic.

With reference to the sods, Dr. Maclagan says—

"I examined them for the purpose of ascertaining whether they contained arsenic. I found that they all contained more or less arsenic. Sod No. 1 contained an abundant sublimate of arsenic, which gave a small and distinct arsenical substance; No. 3, a small sublimate, not so much as No. 2; and No. 4, a sublimate equal to No. 2. The arsenic existed in a soluble form. I also examined a sod taken from the adjoining farm, and found no arsenic in it."

Dr. Maclagan, moreover, said in the witness-box—

"I remember, on the 24th of August, receiving the chest containing two jars and a tin box. The smaller jar contained the intestinal canal of a sheep. I subjected it to analysis for the purpose of detecting arsenic. I used Reinsch's test. The paunch contained a large quantity of freshly-swallowed grass, and a minute trace of arsenic. The fourth, or true stomach, contained a very distinct portion of arsenious acid. I applied the test to the three lower stomachs. There was a small amount of arsenic. I also examined the *cæcum*, or *cul-de-sac*. There was more arsenic in 2 ounces of the cœcum than in 12 of the rumen. Dr. Maclagan declares, that supposing he had known nothing of the history of the case, his inference would have been, that the arsenic was swallowed by the animal. It was the most natural way for it to get

there. There are but two theories—one, that it was swallowed with the food; the other, that arsenic had been applied some other way to the animal, absorbed into the blood, had passed with the blood to all the textures, and had then been poured out by the secretion of the intestines, and so mingled with the remains of the food they contained. I should certainly consider the former to be the more probable theory. The arsenic which I found was found in the contents of the stomachs. I did not examine the coats."

The presence of the poison in such large proportion in the contents of the cœcum is, to my mind, convincing proof that it entered the system by the mouth, because the dependent cœcum, like the reticulum, is especially prone to retain materials; and in herbivorous animals in particular, the cœcum acts as a reservoir for fluids which are to be absorbed. The large proportion of arsenic in the cœcum *could not* have entered the cavity by elimination from the mucus surface.

But this was not the whole evidence proving that poison had entered the stomach of the sheep, because in answer to the *belief* that sheep would not eat grass poisoned by sheep-dip,

Henry Wilkinson, veterinary surgeon, in Newcastle, deponed:—"On the 26th instant I made some experiments, for the purpose of ascertaining whether sheep would eat food impregnated with Mr. Elliot's powder. I spread the solution over part of the field. I chose a piece of ground 24 yards by 23 yards, nearly square, and a piece of ground 23 yards by 3 yards. I carefully sprinkled one quart of the solution. There were four sheep left. They had their option of other pasture, and they eat indiscriminately of either. Of the four sheep, two had been dipped and two had not. I consider that they are suffering from the effects of having taken arsenic, and one of them is very likely to die."

In opposition to the foregoing complete and conclusive evidence, that arsenic had by some means got on to the grass, and into the alimentary canal of the sheep, the witnesses for the pursuer stated several suppositions. Professor Dick said, referring to one of the sheep—

"Poison, in my opinion, was the cause of death in that sheep. I believe it was arsenic. It is scarcely possible to say in what way it was taken in; but my judgment was that it was absorbed by the skin. Assuming the mixture, of which I have heard the analysis, and applied in the way I have heard it was applied, I am decidedly of opinion that the quantity of arsenic in the mixture was the cause of death, absorbed by the skin. The mixture applied with the arsenic, and soft soap and soda, would materially assist in the process of absorption."

Professor George Wilson stated that arsenic might be absorbed by the skin under the same circumstances as in Mr. Black's sheep, and have caused death.

Lastly, we have Dr. Murray Thomson's remarkable declaration that—

"Sheep washes containing arsenic, and in as large proportions, have been used with impunity, but not without risk. Arsenic is a very capricious poison. It sometimes may be used and does not produce poisonous effects, and other times it will, under the same circumstances. I do not know to what to attribute that. I think if poison had been taken by the throat, it would have been found in the stomach, but I should consider it very unlikely to have passed through the mouth. I found arsenic in the second stomach, but had it passed through the mouth, it would have been found in large quantities."

The only point which remains to be settled is, how did the arsenic get on to the grass?

Thomas Brown deponed, that it was a very fine day when the sheep were dipped, but it *rained a little towards midnight.* It was said by Robert Tate, senior, that when the sheep left the curtains they did not *appear* to be dripping. The sheep, however, had been bathed very rapidly, and certainly not less than at the rate of 90 per hour. They had been enclosed in curtains, and the first lot bathed were moved into the fields at 2 p.m. The whole afternoon, until 7 o'clock in the evening, the sheep were driven almost as fast as they were dipped on to their pastures. Much has been said of the shower of rain after the sheep had been dipped. Probably showers of rain would have washed the arsenious acid, which none will deny must have entered, in considerable quantities, in the fleece of the sheep, directly into the soil; but a moderate amount of rain, would, perhaps, most effectually have carried the arsenic on to the surface of the grass only. That 7 sheep that had not been dipped survived, and that

18 of those dipped in the weaker wash, towards evening, were also saved, are, doubtless, curious facts; but, as to the first, it can well be understood, that they would not at once mix with the bathed sheep, and feed among them; they would not, as the other sheep, poison the grass immediately around them, and, indeed, they could not ravenously devour grass like the dipped sheep, at the period when that grass was most highly charged with poison, the very night after the dipping process. It is a fact, that after dipping, and after some hours' starvatiou in the curtains, the sheep would eat greedily and fast, and, in my mind, that is sufficient to account for another remarkable fact, that the sheep seemed to have died off in rotation according to their turn in dipping. It must be remembered, that the first were starved from 6 a.m. to 2 p.m., and indeed could have eaten little since the previous evening. With reference to the 19 dipped in a weaker solution, and which did not die, it must be borne in mind that the flock of 869 sheep were placed in different fields, and the 60 gimmers dipped in a weaker solution were sent into a field by themselves. If the solution in which they were dipped was weaker, the grass would become charged with less arsenic, and thus the mortality would not only be partial, but occur, as it did, at a later period than with the other sheep, from the more gradual introduction of poison into the system. One sheep died very recently, according to the evidence of Thomas Brown.

Supposing the above hypothesis had no foundation in fact, surely it is inconsistent to attempt to deny that which is demonstrable—*that sheep-dipping mixtures are not absorbed by the skin*—on the ground that 7 undipped sheep were saved, and 18 dipped in the weaker solution did not suffer, out of the flock of 869 which were dipped at Burton on the 14th August last. Myriads of sheep have been bathed with impunity, though, notwithstanding Dr. Thomson's opinion as to the capriciousness of the poison, each animal would be destroyed into whose stomach arsenic in sufficient quantity had been introduced. Here are facts to prove impregnation of the grass by poison—introduction of arsenic into the alimentary canal—the existence of that arsenic in the contents of the stomach and intestines of the sheep—and, lastly, that arsenical solution cannot be absorbed by the skin; and, in the face of that, Mr. Elliot of Berwick is to be mulcted to the amount of £1400 and costs, because his mixture was, *on the ground of mere hypothesis unsupported by a single experiment*, declared to be not reasonably fit to be used according to the printed directions supplied with it.

It is my firm belief that arsenic is by far the most valuable destroyer of parasites which farmers can employ for their sheep. Of all the poisons, it is perhaps the safest when employed in the shape of a bath. Farmers cannot and will not do without it, but whenever they can claim damages for their own neglect, or for accident after bathing, such as happened most unfortunately at Burton, how can they expect a respectable Chemist and Druggist to supply them with any of the dipping mixtures they so constantly and gladly make use of. It is to the interest of the agriculturists throughout Great Britain, more than to the interest of the Chemist, that, if there be any mystery about the manner in which the sheep were destroyed at Burton, that mystery should be cleared up. Further investigation must prove that Elliot was not only innocent, but could in no way be held responsible for the loss of 850 sheep by Mr. Black, last August, and that farmers must employ that which they know to be poisonous with all the precautions which are known to be requisite by any person of common sense. What became of the residue of the dipping mixture left in the tub after the sheep had been dipped? No one at the trial could speak as to the manner in which fifty or sixty gallons of strong arsenical solution, sufficient, perhaps, to poison the inhabitants of a village, were disposed of. Perhaps the donkey, through whose sore back the arsenic penetrated from the *fleece of the sheep* which he carried—and, by the way, which had been declared well drained—not only had access to the fields when he was employed in removing the carcases, but also, as proved by the plan of the farm, might get at the tub, round which, at all events, there would be a quantity of poisoned straw.

The evidence in favour of the view, that carelessness on the part of the farmer and his men at Burton, during and after dipping, aided by the inclemency of the weather, were the causes of the poisoning of the sheep, is so patent, that we cannot see how any other opinion of the wholesale poisoning can be for a moment entertained, but as some very interesting points, with reference to the elimination of arsenic from the

system, have not been made out, we have undertaken a series of new experiments, and shall continue our researches so as, if possible, to exhaust the subject. We hope to publish further experiments and observations in a subsequent number of the *Pharmaceutical Journal.*

The last Scientific Meeting of the present Session was held on the evening of the 19th April, in George Street Hall. There was a good attendance, including Dr. Omond, President of the College of Surgeons, Mr. Hutchins, &c. &c.

MR. JAMES ROBERTSON, PRESIDENT, IN THE CHAIR.

Mr. Robertson requested his partner, Mr. Stephenson, to read the following paper

ON INFUSIONS.

We are all practically familiar with the frequent inconvenience experienced in dispensing prescriptions containing the infusions of the Pharmacopœia. The concentrated infusions have been introduced with the view of obviating this inconvenience, but I think the great majority of Pharmaceutists regard their use as eminently unsatisfactory. I have been induced to bring under your notice this evening a plan, which we have adopted and practised for many years, and which, from its extreme simplicity, and the perfect success which has attended it, will, I trust, recommend itself to your favourable consideration.

It has not the merit either of originality or novelty, being merely the application in a simple and practical form of the principle on which the familiar essence of beef is prepared, and has indeed already been applied to the preservation of infusions by Mr. Alsop, of London, as described in Mr. Redwood's *Practical Pharmacy.* He recommends the infusion to be filled into bottles with accurately ground stoppers, to be heated until the infusion overflows, then to be closed immediately with the stoppers, which are to be slightly coated with wax, so as to render the bottles perfectly air-tight. I think there are several disadvantages attending this plan, not the least of which must be the uncertainty of obtaining perfectly accurately fitted stoppers—a condition on which the success of the process absolutely depends. Our adaptation of the plan is as follows :—We fill the infusion, freshly prepared and filtered, into common bottles of any convenient size, up to the bottom of the neck. These are placed in a vessel of water, put on the fire, and allowed to remain until the water has boiled round about them for ten or fifteen minutes. By this time the Infusions will be found to be running over the brims of the bottles. They are then removed one by one, and immediately closed by simply tying a piece of moistened bladder over the top.

We generally prepare as much of each infusion as will last for two or three months; but it will retain for years the fresh taste and aroma of its ingredients. You will find on the table a sample of infusion of senna 2½ years old, infusion of orange 17 months, and chiretta, senega, and calumba about three months.

The advantages of this plan are manifest, and hardly require mention. From its extreme simplicity, any Druggist can put it in practice for himself, and can thus always command an infusion the same as freshly prepared, superior to that formed by the concentrated infusion, and not containing any spirit—a matter occasionally of some moment.

Various samples of infusions prepared in the manner stated were submitted to the meeting ; some of them had been prepared for a considerable time, and appeared as fresh and good as if recently made.

The Chairman then introduced Mr. Morrison, dentist, who read the following paper on his

NEW COMPRESSES, OR STOP-COCKS FOR FLEXIBLE TUBES OR PIPES.

These compresses may be said to be of two kinds—the tubular and the clasp, which I will describe separately, so that any one at a distance may make them from the description. First then, the tubular, as its name implies, is mainly composed of a simple tube, the exact size of the flexible tube intended to be used, so exact that the metal tube just passes clear *over* the flexible. This tube may of course be any length,

but three inches long will be found very convenient. To this tube there is attached a rectangular piece, soldered on the *outside* of the tube, leaving the metal tube entirely clear. To this rectangular piece is hinged two side plates, same length as tube; one end of each being bent at a right angle, about a quarter of an inch from the end, is made to fit into corresponding slits on each side of the tube, so that when close the sides are very nearly, but not quite, parallel. These plates being hinged, have of course a play outward and inward through the slits in the tube, and which are closed by a sliding keeper, and which keeper is kept from getting away from the one end by a ring soldered on the outside of the metal tube, and from the other by the fact that the sides diverge from the parallel. The clasp compress is intended to pinch the flexible tube when both ends are engaged, and which of course enters from the *side*, and not lengthways, along, as in the tubular. It is simply two pieces of plate hinged in the centre to each other, and closed by means of a pin, passing partly into the one and partly into the other. Another form is closed by a sneck similar to a press, and which passes through one of the plates, and when through turns 90°, or the fourth of a circle, which keeps it secure.

A third form of this kind is a compound of the lever and the screw, and is intended for tubes which are meant to resist high pressure, in which case the same principle of the lever is employed; but in addition to this it is closed by a nut of a screw. This compress, of course, from being regulated by a screw, is the most perfect of them all, and susceptible of the greatest possible nicety of touch, and which, moreover, by having an index attached to it, can have all its work registered.

Mr. MORRISON submitted for inspection several of these stop-cocks, which were very much admired. The adaptation of them to any kind of elastic tubing is exceedingly simple, and not more simple than effective for the purpose intended. Some Members present thought that these compresses might yet be found useful in many pharmaceutical processes.

A vote of thanks to Mr. Morrison, proposed by the CHAIRMAN, and seconded by Mr. MACKAY, was carried with acclamation.

WEIGHTS AND MEASURES.

The CHAIRMAN then introduced the subject of weights and measures, stating that that important matter was at present under the consideration of the Committee now engaged in Edinburgh with the compilation of the National Pharmacopœia. After adverting to Mr. Squire's proposed alteration, as well as to another plan suggested by Mr. Warington, he read the following short paper by Dr. Charles Wilson:—

"Until a general decimal system be adopted, the existing anomalies and disadvantages as to medicinal weights might be remedied by an adjustment, grounded as follows:—

"The present weights for liquids in the Pharmacopœia being based on avoirdupois, there is now actually, at least in the London and Edinburgh Pharmacopœias, a mingling of two different weights, the troy (apothecaries') and avoirdupois (imperial), in every formula where liquids and solids are combined.

"The number of troy grains in the avoirdupois drachm is 27.34375. The troy grain, therefore, can never be a proper basis for the avoirdupois weight, or be easily assimilated with that weight, because it is not an integral part of any of its sub-divisions. Hence, the change adopted in the Dublin Pharmacopœia, though in the proper direction, does not go sufficiently far.

"But by reducing the troy grain to 0.91145 of its present weight, or taking from it a little more than an eleventh, and adopting this as the medicinal grain, the grain for solids would be equal to the computational weight of the grain, or its representative, the minim, in the liquid measure; and the present avoirdupois drachm would be an entire multiple of the grain, of which it would contain 30.

"Thus the medicinal weights of solids would be at once fundamentally assimilated with those of fluids, and both would be rendered identical with the commercial weights, their discrepancy from which is at present a flagrant source of practical inconvenience.

"The equalization of the grain, in this way less an innovation than a completion, would be the only change required or effected, and it is one which there seems to be an authority to effect under the 54th clause of the Medical Practitioners' Act, while

it can never be so fittingly done as now. The present medicinal drachm, perhaps under the title of the didrachm, as equal to two imperial drachms, with its ancient symbol, might be retained ; it being understood to contain still 60 medicinal grains, but equal only to 54.68750 of the former (troy) grains.

"Should it be determined to include the avoirdupois drachm, specially, as half the didrachm, it might be denoted by the old symbol ʒss. ; or a new symbol might be devised for it, as, for instance, the Greek delta △. In the one case, all symbols would remain as before ; in the other, a single new one would be introduced.

"The avoirdupois pound would thus consist of 7680 medicinal grains, and the division, whether for solids or fluids, would be as under:—

Pounds.		Ounces.		Didrachms.		Scruples.		Grains.
℔j.	=	℥16	=	ℨ128	=	℈384	=	gr. 7680
		℥j.	=	8	=	24	=	480
				ℨj.	=	3	=	60
						℈j.	=	20

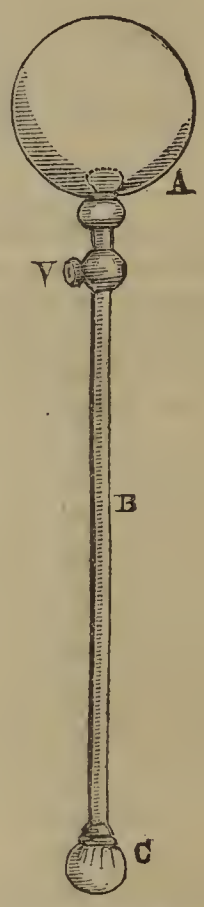
(The ½ didrachm = imp. drachm.
ʒss. = △j.)"

The only alteration proposed by the meeting was that the term *didrachm* should not be used, and that some distinctive mark should be put upon all new weights, in event of the troy being discontinued, with the view to prevent any mistake by the substitution of the *old* instead of the *new* weights.

After some discussion, it was proposed, seconded, and unanimously carried, that Dr. Charles Wilson's plan be recommended to the Committee as the simplest, easiest, and best.

Mr. Mackay made some remarks upon the usual manner of forcing air into the water of aquariums, and showed in action an improved instrument invented by Mr. Stevenson, of Edinburgh, for the same purpose.

The following is a description of it:—



This is a very simple, elegant, and efficient instrument. It is formed of an india-rubber air ball, A, attached to one end of a glass tube, B, which has a ball of cotton wool, C, tied firmly to the other end of it, whilst there is a valve opening inwards. When the india-rubber ball is pressed or squeezed, the air expelled from it shuts the valve, V, rushes down the tube, and is forced through the ball of cotton, which distributes it in small globules. When the pressure is removed, the expansion of the elastic india-rubber ball opens the valve, the external air rushes through it and again fills the ball, so that by alternately squeezing this ball with the hand and relaxing the pressure, a current of fresh air is thrown out at the ball of cotton.

The meeting was highly pleased with this very simple and easy way of supplying air to aquariums.

He then submitted one of Mr. Savory's new poison bottles. Some conversation took place, especially in reference to the one intended to contain powerful or poisonous medicines. The general feeling of the meeting appeared to be decidedly against their introduction ; but Mr. Mackay thought the idea a good one, and, although the shape of the bottle was not to be admired, yet the contracted neck might in many cases prevent accident, for while there appeared a difficulty in dropping some fluids from this new bottle, a very short time would show whether in practice they were likely to be used by Pharmaceutists.

The Secretary read the following

REPORT OF THE PRIZE COMMITTEE.

The Committee have to report that two essays were sent to the Secretary, one "On the Different Kinds of Manure," and the other "On the best Mode of Preparing the Ointments and Cerates of the London Pharmacopœia."

The first of these the Committee think deserves the President's Prize. Of course the subject treated on is necessarily one where neither original or practical matter could be expected, yet the Committee are much pleased with the care, zeal, and research the writer has bestowed upon the subject. The manuscript is also very neatly and correctly written, and the Committee therefore have much pleasure in awarding the President's Prize to the party whose name was found in the sealed envelope corresponding with the motto on the essay—viz. Joseph P. Crossby, Associate of the Society, and assistant to Mr. McCulloch, South Bridge, Edinburgh.

The other essay is not so meritorious as to deserve a prize, but the Committee desire to record their sense of the labour and trouble bestowed by the writer of this paper, and recommend that a volume be given from the register fund, as a recompense to the party competing, whose name obtained, from the sealed envelope, is William Albert Sanger, Pupil of the Society, and residing at 8, Torrington Place, Gordon Square, London.

Mr. Crossby being present, was called upon to receive the President's Prize, which was a *Cyclopædia of the Arts and Sciences*, handsomely bound. As Mr. Sanger was not present, the volume for him will be sent by post.

There were some donations of books, and several very valuable contributions to the Museum, which the meeting viewed with interest. These will be enumerated in the Annual Report.

The PRESIDENT delivered the following

VALEDICTORY ADDRESS.

GENTLEMEN,—We have now brought to a close the evening meetings for this session, and I am happy to be enabled to say that the attendance of members, as well as of gentlemen of the medical profession, has been more numerous than in any former year, affording the pleasing evidence that the proceedings of our Society are gaining a greater amount of interest than they have hitherto done; and I venture to say that the more any one will attend to the efforts that have been, and are still being, made for the improvement of our position as Pharmaceutists, he cannot fail to be convinced of the propriety and advantage of encouraging and helping on the good work to the utmost of his power.

We have had cause to be well satisfied with what has passed under our notice this session. We were highly favoured at the outset by the kindness of Prof. Laycock giving us so interesting a lecture on the Pharmacy of the olden times, combining also many valuable hints for our future guidance. We had also the pleasure of listening to the able and important lectures of Dr. Macadam and Prof. Gamgee on the composition, use, and action of sheep-dipping mixtures, more especially with reference to the recent case of sheep poisoning in Northumberland; a subject of deep import to all our brethren who deal in such compounds. Our Secretary also afforded us some useful and curious information regarding otto of roses ; and I must not forget to mention Mr. Burrell's able paper on Pharmacy, as it was, as it is, and as it ought to be. I had hoped that we would have been favoured with more such communications from members at a distance, who cannot conveniently be present at our evening meetings, but I trust there is a good time coming for such efforts; at the same time allow me to remind members in town that our evening meetings are by no means intended exclusively for finished or scientific papers, but that remarks, however short, and on subjects, however seemingly unimportant, by eliciting discussion might contribute greatly to the interest and usefulness of our meetings.

I hope that what has been said to-night regarding the weights and measures of the Pharmacopœia, may have the effect of helping on the adoption of Dr. Charles Wilson's proposal, being strongly convinced that it would prove a great boon to all dispensing Pharmaceutists.

Our Museum is increasing in variety and interest, and several books have been added to our Library since last session.

I am glad to say that an able essay on Manures has this session been given in, and the Council have awarded it the President's Prize.

It must be highly gratifying to us all to know that during this session a National Pharmacopœia has been in course of preparation, and that the work is confided to gentlemen so highly gifted for such an important task. They have been pleased to

add to their number some members of this Society to assist them in the practical details; a gratifying proof that the Pharmaceutical Society stands well in the estimation of the Medical Council.

We have again this session been threatened with a "Sale of Poisons Bill;" happily for the present withdrawn. We owe much to our President and Council in London for their unwearied zeal, and energetic efforts, in watching the progress of these bills. Let us hope that before another such bill is introduced into Parliament, the framers of it will call to their aid the Council of the Pharmaceutical Society. We must admit the necessity of some such bill; at the same time, the difficulties connected with the subject are such, that every information from those practically acquainted with its details, ought to be called into requisition. For my own part, I am unable to see how the proposed restrictions as to the sale of opium and its preparations, chloroform, oxalic acid, and salt of sorrel, can be carried into effect in the ordinary routine of a druggist's business.

However valuable an Act of Parliament may be in checking and lessening the accidents arising from the sale of poisons, there can be no doubt but that the Pharmaceutical Society, by raising the educational status of its members, is working out a far better security for the public, and it is much to be regretted that this more excellent way is quite overlooked by the Legislature.

In conclusion, gentlemen, I beg to thank you for the kind indulgence I have experienced at your hands in my humble endeavours to fulfil the duties of this chair, and, in taking my leave, to express a hope that we may be all spared to assemble together next session, with renewed vigour, and a determination to make it surpass its predecessors.

Mr. YOUNG proposed that a vote of thanks should be given to Mr. Robertson for his valuable services during the past year as President of the Society, which was seconded by Mr. TAIT, and carried unanimously.

Mr. ROBERTSON having replied, the meeting adjourned.

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

THE Eleventh Meeting of the Session was held in the Royal Institution, March 31,

THE PRESIDENT IN THE CHAIR.

The SECRETARY announced donations from Mr. A. Redford.

Dr. COLLINGWOOD then delivered a lecture "On the Morphology of Plants," which will appear in the next number.

Royal Institution.

The Twelfth Meeting of the Session was held on Thursday, April 14,

THE PRESIDENT IN THE CHAIR.

The SECRETARY announced donations to the Library from Mr. Wright.

Mr. ABRAHAM stated that at the next meeting he would make some remarks on the preparation of tinctures.

Dr. EDWARDS announced that the prize for the best laboratory essay had been awarded to Mr. Dyce Duckworth. Dr. Edwards then proceeded to deliver the lecture of the evening, "On Alumina—Clay and Pottery," which was illustrated by numerous specimens from the Museum of the Association, and the Museum of the Royal Institution.

ORIGINAL AND EXTRACTED ARTICLES.

WEIGHTS AND MEASURES PROPOSED TO BE USED IN THE NATIONAL PHARMACOPŒIA.

MR. SQUIRE'S PROPOSITION.

THE Government having enacted that the Medical Council shall decide upon *the true Weights and Measures* that are to be used in the Pharmacopœia, it is

most important that each system should be well examined before making choice of the one to be used for medicine.

As I have paid some attention to the subject, I will state the conclusions at which I have arrived.

I will begin by mentioning what I think serious objections to the *Avoirdupois system*.

That it was not framed for weighing medicine, its lowest division being a drachm, the sixteenth part of an ounce.

That the pound weight does not accord with the pint measure.

The sixteenth part of a pound, and the twentieth part of a pint, are the only parts of the system in which the weight and the measure agree, *i.e.* an ounce.

The ounce does not contain a whole number of grains, being equal to 437.5 troy grains, and therefore incapable of division without fractions of a grain.

The use of it is discontinued in every country except England and America. Mr. Drinkwater Bethune, one of the Commissioners on Weights and Measures, who reported in 1841, says of it, "that it is difficult to conceive a system more thoroughly well contrived in every part to cause intricacy and confusion."*

In the year 1851, when the last edition of the Dublin Pharmacopœia was published, the avoirdupois weight, for the first time, was tried in medicine, probably on account of the ounce being of the same value as the twentieth part of the imperial pint, and this ounce of 437.5 grains was divided into drachms of 54.7 grains, and scruples of 18.22 grains. New weights were expressly manufactured to include the above fractions; the difficulty of prescribing or of calculating with such weights must be apparent, to say nothing of the different values of weights bearing the same name.

If the Committee be induced to adopt the avoirdupois weight, the whole of the dispensing weights throughout England and Scotland must be changed, and all prescriptions written and registered prior to the date of adoption must suffer change too, having to be dispensed with weights of another system, and of less value.

The Apothecaries' weight, on the contrary, is divisible into ounces, drachms, scruples, and whole grains; has been used in medicine by civilized nations from time immemorial; France only parted with it when the Metrical system came fully into operation as a national system. It may be seen in the Codex side by side with the gramme and cubic centimetre in the former edition of that work; a very nice way of habituating Pharmaceutists to its value without any risk of confusion or leading to error. The 1lb. of Holland, and of the German Zollverein, isequal to the half kilogramme, or 500 grammes. Sixteen ounces of our *Apothecaries'* weight is equal to the same thing. The following table will show with what facility we are able to compare our Apothecaries' weights with our Metrical weights:—

APOTHECARIES' WEIGHT.	THE METRICAL WEIGHTS.	
Ounces.	Grammes.	
	Approximate.	Correct.
32	1000	995.302
16	500	497.650
8	250	248.825
4	125	124.412
1	31	31.103
One drachm.	4	3.887
15 grains.	1	.972

It must be remembered that 1000 cubic centimetres, or 1 litre of distilled water, weighs exactly 1000 grammes, or 1 kilogramme.

I propose to introduce the Metrical system into the British Pharmacopœia, side by side with our own formulæ, throughout the work, that we may have the advantage of both, and be able to make ourselves fully acquainted with the Metrical system, in case this Government should order its use; giving full tables of explanation and comparison with our own weights. The following

* Letter to the Rt. Hon. the Chancellor of the Exchequer (now Lord Monteagle), p. 6.

gives an example of the Apothecaries' weight and the Imperial measure as found in the London formula, with their respective value in Metrical equivalents, with a separate column to show how it would appear in the Metrical system :—

TINCT. BELLADONNÆ.

TINCTURE OF BELLADONNA.

	Metrical Equivalents.	Metrical System.
Take of Dried Belladonna Leaves, 4 oz.	125	110
" Proof Spirit, fluid 40 oz.	1135	1000

I think it would be unwise to alter our present weights and measures, as any alteration would be fraught with inconvenience, and, perhaps, danger. Since the Metrical system is already in use in France, Holland, Belgium, Lombardy, Greece, Switzerland, Sardinia, Spain, and the States of South America, and coming into operation in Portugal in 1862, let us keep as we are until we change for *this*, the only Decimal system in existence, the beauty and perfection of which claims for it a preference in every civilized nation. P. SQUIRE.

277, *Oxford Street.*

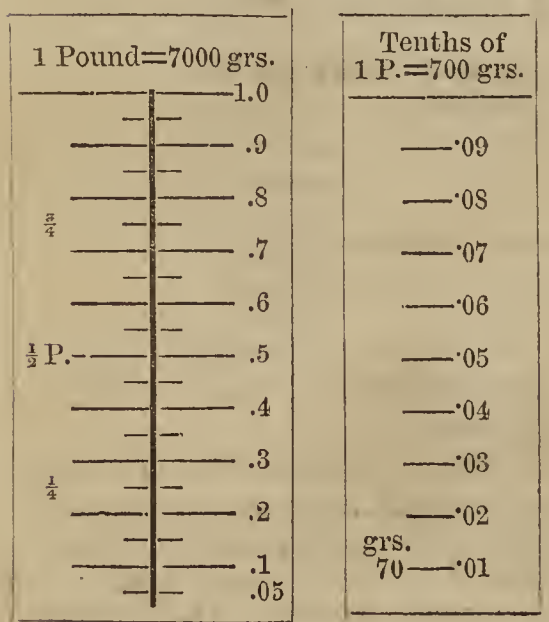
MR. WARINGTON'S PROPOSITION.

My proposition consists in reducing the present weights and measures of the Pharmacopœias to one denomination. For this purpose I would suggest that the pound avoirdupois of 7000 grains be taken as the unit, and decimated for the lower denominations down to 70 grains, the extreme of the scale being the one grain.

These decimated weights and measures may be denominated tenths (*t*, *ft*) and hundredths (*h*, *fh*) of the pound, the affix *f* or *m* being employed when it is wished to indicate that the quantity is by measure. The weights, &c., below the 70 grains or .01 pound, being specified in grains (*gr*, *fgr*). The pound may be represented as *P*, *fP*. The weights and measures above this unit to be increased by tens as ten, the imperial gallon (*T*, *fT*), and hundred (*H*, *fH*).

This arrangement, while it causes no material alteration in our present commercial weights and measures, would induct all parties into a thorough knowledge of decimal fractions, so that if any *Legal alteration* in the National weights and measures should be deemed requisite, as by the adoption of the Metrical system used in France, &c., the public will have become aware of its utility and practical bearing.

1 grain				
70 =	1 hundredth	·01		
700 =	10 =	1 tenth	·10	
7000 =	100 =	10 =	1 pound	
70000 =	1000 =	100 =	10 =	1 T. or imperial gallon
700000 =	10000 =	1000 =	100 =	1 hundred pounds



A smaller measure of 70 grains divided into 7 parts; and, therefore, of 10 grains each division, and a drop measure divided n grains.

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ROBERT WARINGTON.

Apothecaries' Hall, Blackfriars, March 31st, 1859.

REPORT OF THE
RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION,
AND OF THE
APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

Investigation of the Salts of Chromium.—M. G. Fremy,* in a communication to the French Academy, has given the results of a careful examination of the compounds of this metal. It is well known that the violet salts of chromium, such as the sulphate or chrome alum, when moderately heated, pass to a bright green colour, and at the same time are rendered uncrystallizable. These salts, also, when treated with an excess of ammonia, furnish liquids of a violet-rose colour. Although these facts have been made the subject of investigation by Berzelius, Schrötter, and Löwel, the difference between these two classes of salts, the violet and the green, has been involved in some degree of obscurity; neither were we acquainted with the composition of the rose-coloured compounds formed with ammonia.

M. Fremy shows that when a violet salt of chromium is precipitated by ammonia in the cold, a hydrate is obtained, which, when dried *in vacuo*, may be represented by the formula Cr_2O_3, 9HO, to which he applies the name *metachromic sesquioxide.* This hydrate may be recognized and distinguished from the well-known green variety by its solubility in acetic acid, ammonia, and dilute solutions of potash. Very slight causes are apparently sufficient to effect a modification of this body; thus, the action of boiling water, the presence of concentrated saline solutions, the prolonged contact of cold water, desiccation in the open air or *in vacuo* continued for several days, or friction for a few moments, are sufficient to destroy its solubility in the above reagents. The author considers this alteration in the property of the hydrate to be due to an isomeric change, and not to any dehydration; in fact, it seems hardly probable that the mere contact with cold water for a few days could deprive the molecule of a portion of its water; analysis, moreover, indicates no difference in the composition. He retains and applies the name *sesquioxide of chromium* to the green oxide which, as when produced in the above manner, is insoluble in acetic acid, ammonia, and dilute potash. When this body has been formed by the alteration of the metachromic oxide, it may be reconverted into that state by boiling it with an excess of acid and reprecipitating it with ammonia.

After thus clearly ascertaining the existence of two isomeric conditions of oxide of chromium, M. Fremy investigated the changes which the salts undergo by the action of heat, and he found, as the result of a series of experiments, that when a violet salt of chromium is rendered green by ebullition, there is no elimination either of acid or base, but that the change is simply due to the conversion of the metachromic oxide into the ordinary oxide of chromium. He precipitated the two varieties of salts by ammonia, and found the resulting oxides to possess all the different properties above adverted into. The effect, therefore, is simply produced by an isomeric modification of the oxide contained in the salt.

Amido-Chromic Compounds.—The two isomeric oxides of chromium do not, as has been previously stated, react in the same manner with ammonia, the oxide modified by heat remaining unaffected, while the metachromic oxide acquires a violet tint, and produces an amide compound which appears to be formed by the union of equal equivalents of oxide and ammonia. This body, when heated, evolves water and ammonia, leaving a residue of anhydrous sesquioxide of chromium. Ammoniacal salts alone exercise no action on metachromic oxide, but when treated with a mixture of any ammoniacal salt and free ammonia, the oxide completely dissolves, producing a compound remarkable for its fine violet-rose colour. The bodies thus formed may be isolated by the addition of alcohol to the solution, which precipitates the salt, and rapidly drying *in vacuo.* Any of the ammoniacal salts, when mixed with free ammonia, are capable of thus dissolving the metachromic oxide and forming these coloured compounds, the general properties of which may be indicated by the description of that produced by muriate of ammonia.

This body, which, when dry, is of a fine violet colour, is remarkable for the

* *Comptes Rendus.*

manner in which the chemical characters of its components are masked. If dissolved in water, it forms a deep violet rose-coloured solution, the reaction of which is scarcely alkaline, although it contains a considerable proportion of ammonia; nitrate of silver gives no precipitate in its solution, yet it contains the elements of hydrochloric acid. The usual reagents do not reveal the presence of oxide of chromium, although it is the base of the compound.

By simply boiling the solution, however, the substances named become at once sensible, a considerable quantity of ammonia is disengaged, hydrated oxide of chromium is precipitated, and sal ammoniac may then be detected in the solution. The bodies constituting this singular compound separate in the proportion represented by the formula—

$$2\,(Cl\,H,\,N\,H_3),\,4\,N\,H_3 + 3\,Cr_2\,O_3 + Aq.$$

This decomposing action of water calls to mind the transformation of the amides into ammoniacal salts, hence the author has given the name *amido-metallic bodies* to the substances just described. Looking at these phenomena, which prove that ammonia, reacting upon a metallic oxide and any ammoniacal salt can form compounds in which the distinctive characters of the elements are lost, in the same manner as cyanic acid loses it generic properties when, in the presence of ammonia, it forms urea, it is impossible not to see that mineral chemistry is perfectly identical with organic chemistry.

When a solution of an amido-chromic body is exposed to the air for some time, it rapidly decomposes by reacting upon the water; ammonia is evolved, the ammoniacal salt is regenerated, and an insoluble violet body deposited, not in crystals, but in the form of small rounded transparent grains, having an opaline lustre. This substance is also an amide, consisting simply of oxide of chrome and ammonia. The action of boiling water effects its complete decomposition, when the elements separate in the proportions represented by the formula

$$Cr_2\,O_3,\,NH_3,\,12\,HO.$$

Acids do not convert this body into a salt of chrome, and an ammoniacal salt, but they give rise to a salt of a new ammoniaco-metallic base, termed by the author *roseo-chrome*, in which one equivalent of oxide of chromium is associated with four equivalents of ammonia, and should consequently be represented by

$$Cr_2\,O_3,\,4\,NH_3.$$

The decomposition of the insoluble violet amide by the acids being explained thus:—

$$4\,(Cr_2\,O_3,\,NH_3) + 12\,So_3 = 3\,(Cr_2\,O_3,\,3\,So_3) + \underbrace{(Cr_2\,O_3,\,4\,NH_3),\,3\,So_3}.$$

Sulphate of roseo-chrome.

This roseo-chromic base may be also easily produced by reacting with cold concentrated acids upon the soluble amido-chromic compounds, precipitated by alcohol from the rose-coloured liquids resulting from the solution of metachromic oxide in ammonia and ammoniacal salt. The roseo-chromic salts are of a nearly pure rose colour; the muriate crystallises with the greatest facility from an acid solution in fine regular octahedra $(Cr_2\,O_3,\,4\,NH_3)\,3\,HCl$. It forms crystalline double chlorides with platinum and mercury.

The roseo-chrome does not appear to be the only basis substance which may be formed by the action of ammonia upon oxide of chromium. Pure water is capable of decomposing the hydrochlorate of roseo-chrome, producing a new salt which crystallizes in fine, right rhombic prisms, and another saline compound more soluble than the preceding. These salts appear to contain different bases. M. Fremy, therefore, considers that a numerous series of amido-chromic bases will be formed, corresponding to the cobaltique series previously investigated by him, and which are represented as follows:—

$$Co_2\,O_3,\,4\,NH_3$$
$$Co_2\,O_3,\,5\,NH_3$$
$$Co_2\,O_3,\,6\,NH_3.$$

Roseo-chrome $(Cr_2\,O_3,\,4\,NH_3)$ might then be the first term of a series of analogous double bases. While abstaining from any theoretical considerations of their constitution, he points out the fact that the base roseo-chrome combines, like sesquioxide of chromium, with three equivalents of acid to form neutral salts; the four equivalents of ammonia, which enter into its molecule, exercise, therefore, no influence upon its

capacity of saturation. In this respect, also, these bodies correspond to the amido-cobaltic bases, which, containing as many as six atoms of ammonia, only saturate three equivalents of acid, like the sesquioxide of cobalt which enters into the molecule. Organic chemistry presents numerous examples of bodies which lose their saturating power as they form more complicated molecules, thus confirming the relationship which appears to exist between these amido-metallic bodies and organic substances. The following are the general conclusions which the author draws from the investigation:—

"1. It is shown that a metallic oxide may assume two isomeric conditions, and form two series of salts, presenting very marked differences in their general properties, which are due to the particular state of the oxide contained in the saline compound. If this observation extends, as I doubt not it does, to several metallic oxides, it will be easy henceforward to explain the modifications which certain salts present in their colour and chemical properties when submitted to the action of heat. The isomeric modifications of the oxide would be the cause of these changes in the properties of the salt.

"2. It is already known that many oxides, such as the oxide of platinum of mercury, iridium, cobalt, &c., can associate their molecule with ammonia and form double bases, which present some analogy to the organic alkalies, but we see here, for the first time, a metallic oxide, such as metachromic oxide, reacting simultaneously upon ammonia and an ammoniacal salt to form compounds in which the three elementary bodies have lost their fundamental properties.

"3. In my researches upon cobalt, I produced the amido-metallic bases by the direct action of ammonia upon the salts of cobalt. In this research I have generated the amido-chromic bases by placing the metallic amide in presence of acids. It is thus that the methods for the formation of complex bodies from simple mineral substances are increased every day, and it is interesting to see that the synthetical processes, which have been employed for some time in organic chemistry for effecting the coalition or doubling of molecules, are now known in mineral chemistry."

Two Volatile Acids obtained from the Berries of the Mountain Ash.—Dr. Hofmann* has described two new acids obtained from the berries of the *Sorbus Aucuparia*, or mountain ash. It is well known that in the preparation of malic acid from these berries, during the evaporation of the liquid partially saturated with lime, a peculiar penetrating odour is evolved. M. G. Merck, of Darmstadt, therefore, submitted this liquor to distillation, and by suitable treatment obtained from the acid distillate an aromatic oil, possessing some very curious properties, which have been carefully investigated by Dr. Hofmann.

This oil, when perfectly pure, is a transparent, colourless liquid, having a penetrating aromatic odour, a sp. gr. 1.068, and a boiling point 430° F. It is sensibly soluble in water, very soluble in alcohol and ether, yielding strongly acid solutions. It is easily dissolved by the fixed alkalies and ammonia, and also the carbonated alkalies, but without liberating the carbonic acid.

By evaporating the latter solutions, salts are obtained, which are uncrystallizable. The ammoniacal compound gives with nitrate of silver a gelatinous precipitate, which blackens by exposure to light. The analysis of the oil and the silver compound led to the following formula :—Free acid, C_{12} H_8 O_4 ; silver compound, C_{12} (H_7 Ag) O_4. This composition is confirmed by a remarkable transformation which the oil undergoes by the action of concentrated alkalies or acids. When digested for several hours with solid hydrate of potash, at the temperature of boiling water, a potash salt of a magnificently crystallizable acid is obtained, resembling in its general appearance benzoic acid. No trace of hydrogen is evolved during this action. The same transformation is effected when the oil is boiled with strong hydrochloric acid, or when its solution in cold sulphuric acid is treated with water.

Dr. Hofmann considers this change to be due to a simple molecular transposition. In fact, the analysis of the new acid and of its salts show that it has the same composition as the oil :—C_{12} H_8 O_4. He therefore denominates the crystallized acid *sorbic acid*, and the oil *parasorbic acid.* Sorbic acid is slightly soluble in cold, but

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* *Comptes Rendus.*

very soluble in boiling water. It dissolves very easily in alcohol and ether. Crystals five or six centimetres in length are obtained by the cooling of a boiling solution in one volume of alcohol and two of water. Its fusing point is 274° F., and at a higher temperature it volatilizes without decomposition. It is a powerful acid, which readily decomposes the carbonates.

Sorbate of silver, C_{12} (H_7 Ag) O_4, is a white precipitate, insoluble in water. Sorbates of baryta and lime are obtained in crystals, having a pearly lustre. Sorbic ether, C_{12} H_7 (C_4 H_5) O_4, is a colourless liquid, of an odour resembling benzoic ether. Chloride of sorbyle is obtained by the action of pentachloride of phosphorus on the acid, or of the terchloride on the potash salt. It easily decomposes by distillation, but the formula (C_{12} H_7 O_2 Cl) is verified by its reactions. Treated with water, sorbic acid is reproduced. With alcohol, sorbic ether is formed. The action of ammonia and of aniline gives birth to *sorbamide* and *phenyl-sorbamide*, substances crystallizing in needles. Distilled with hydrate of baryta, sorbic acid behaves like the volatile acids having four equivalents of oxygen ; an aromatic hydrocarbon is condensed in the receiver, the baryta remaining as carbonate.

Sorbic acid may be considered as the first term of a new series of volatile acids having four atoms of oxygen, occupying a position intermediate between the fatty and the aromatic volatile acids. Thus, comparing it with two acids from these series, containing the same number of carbon atoms, the hydrogen will be found to be intermediate :—

Caproic Acid.	Sorbic Acid.	Homologue inferior to Benzoic Acid.
C_{12} H_{12} O_4.	C_{12} H_8 O_4.	C_{12} H_4 O_4.

Or, by taking acids containing the same number of equivalents of hydrogen, the carbon is intermediate :—

Butyric Acid.	Sorbic Acid.	Toluic Acid.
C_8 H_8 O_4.	C_{12} H_8 O_4.	C_{16} H_8 O_4.

On the Preparation of Calcium and Iodide of Calcium.—MM. Liès-Boudart* and Jobin have obtained metallic calcium by the action of sodium on iodide of calcium in closed iron vessels. They prepare the iodide of calcium for this purpose by making a mixture of plaster of Paris and carbon, which is kept at a white heat in a covered crucible for an hour. The sulphide of calcium thus obtained is dissolved out by water, and iodine gradually added until the liquid ceases to decolorize. A small quantity of slaked lime is then added, and, after the lapse of some hours, the liquor is filtered and rapidly evaporated to complete dryness. When the iodine begins to come off, the heat is removed, and the iodide put in a covered porcelain capsule, this is enclosed in a second earthen crucible, the space between being filled with powdered charcoal, and closed by a lid. It is then heated for about half an hour. When cold, the crucible is broken, and the iodide detached in the form of large flakes, having a pearly lustre somewhat resembling chloride of magnesium, and which easily break under the pestle, very different from chloride of calcium and from iodide of strontium and barium, which are much more resisting, without micaceous structure, and undecomposable by sodium.

To prepare the metallic calcium, one part of sodium and seven parts of iodide of calcium are introduced into a cylindrical iron crucible, closed by a top which screws on perfectly air-tight, and slowly raised to a dull red heat, which is continued for half an hour, the temperature is then raised and maintained at a bright red for an hour and a half or two hours ; care must be taken, however, to avoid a white heat, which would effect a reverse action, the calcium formed turning out again the more volatile sodium. While the crucible is red hot, a gyratory motion must occasionally be given to it by means of the tongs. When cold, the lid is unscrewed, and the contents carefully removed. Sometimes the calcium is found in the form of a single button at the surface, very adherent to the mass, while at other times it is broken up into globules of all dimensions. When the reaction has been very incomplete, unalloyed portions of calcium are found in the midst of the sodium.

The calcium thus obtained has a pale yellow colour, contrasting with the greyish shade of magnesium. It is very brilliant when recently scraped, but quickly tarnishes. Its hardness is less than that of zinc, but superior to tin. By means of a shears it may be cut. The surface sometimes presents here and there cavities filled

* *Annales de Chimie.*

with the matriæ. It may be beaten out into sheets under the hammer. It sinks in chloroform, but floats on bi-chloride of carbon, its density being a little greater than an equal mixture of these two liquids, about 1.55. Exposed to the air, its surface rapidly alters ; in naphtha, it is generally a brownish grey. A bit of the metal, left in the open air for twenty-four hours, is attacked, forming a white hydrocarbonate, analogous to that which lime gives under similar circumstances. The calcium preserves its brilliancy indefinitely, when after being scraped, it is put in a well-closed bottle, with fragments of the salt resulting from its preparation. It decomposes water with tolerable energy, but only acts feebly on a concentrated solution of soda. It attacks ordinary spirit, but does not act on absolute alcohol. When heated to redness, it burns, forming a shower of glittering sparks, which dazzle the eye for several minutes.

M. Niepce's Experiments on Light.—It will be remembered that some time back (see *Pharmaceutical Journal*, July, 1858) M. Nièpce de St. Victor published some remarkable experiments, from which it appeared that solar light may be absorbed by certain bodies, and stored up for an indefinite time, and yet, which may be afterwards emitted, producing the ordinary photographic effects.

These experiments, however, which attracted a good deal of attention at the time, were repeated by several investigators in this country without success, and some amount of discredit was consequently attached to them by English physicists. Mr. Hardwich, who is known to have repeated M. Nièpce's experiments, in the new edition of his *Manual of Photographic Chemistry*, passes them over in silence, stating in his preface "those who read the proceedings of the French photographic society will expect to find here a résumé of M. Nièpce's researches on a new action of light; but the author, after a careful comparison of the results with those previously obtained by Moser and other experimenters, has decided to leave the subject for further investigation."

We learn, from an interesting article by the Abbé Moigno, published in the *Photographic News* for February 18th, that M. Nièpce de St. Victor, desirous of removing these doubts, and establishing the results of his experiments in a satisfactory manner, invited Professor Wheatstone to join him in his laboratory at the Louvre, and witness their performance.

The Abbé thus proceeds:—

"Mr. Wheatstone, the illustrious physicist, very willingly accepted the invitation. M. Nièpce took a tube containing a piece of pasteboard which had been impregnated with tartaric acid, insolated for a length of time, and rolled up in it, in the month of June last, and the tube then hermetically closed. He and Professor Wheatstone placed themselves in a dark room; M. Nièpce had a sheet of sensitized paper, on which he placed a piece of paper printed upon in large letters; he then opened the tube, holding it vertically, with the orifice downwards, and this orifice he placed on the printed paper which covered the sensitive paper; the tube was left in this position for about ten minutes, at the end of which time he removed it. The circle on the paper blackening in all its parts where it was not protected by the printed letters, at once visibly manifested the action of the light; the printed paper being removed, the characters were found to be very neatly traced in white, or forming a negative proof; this negative was treated like ordinary negatives, that is to say, it was fixed, and Professor Wheatstone placed it in his portfolio, to produce it before the Royal and Photographic Societies; a proof obtained by means of light that had been imprisoned for six months. The experiment, therefore, succeeded perfectly. Professor Wheatstone takes with him two tubes, one of which was placed in our hands on the 7th February, 1858, more than a year ago, the other closed in the month of June last, like that which was so efficacious under his inspection, and he will himself repeat the experiment in London before his illustrious colleagues, who will not then retain even the shadow of a doubt as to the reality of the persistent activity of the light.

"In short, every one may succeed whenever he wishes if he operates in the following manner:—Take a very white piece of pasteboard, steep it a sufficient time in tartaric acid, or in nitrate of uranium; the tartaric acid succeeds best and is more certain; expose the pasteboard to the direct light of the sun; leave it to saturate itself with light; you may conclude that this saturation is sufficient when a drop of nitrate of silver blackens instantaneously on contact with the pasteboard; then take

it, roll it, enclose it in a tube of tinned iron; close the tube with solder, and preserve it, if you will, indefinitely. You will thus always have a provision of light ready for such experiments as that of which Professor Wheatstone was a witness."

M. Nièpce has also announced another remarkable discovery, namely, that *radiant heat* is capable of producing photographic effects. When paper, prepared with nitrate of silver and chloride of gold, was placed beneath a negative, and exposed to the action of radiant heat, a very distinct picture was obtained.

Mr. Crookes, the editor of the above Journal, appears to entertain some doubts as to whether the results obtained by M. Nièpce are really due to the influence of light at all, and in proof of which he adduces the following experiments:—

"We dissolved half an ounce of crystallized tartaric acid in about two ounces of water. In this we soaked some sheets of thick English paper. When the solution was well absorbed, the sheets were taken out and hung up to dry. A common tinned iron canister, about eight inches long and three wide, with a lid, was well cleaned inside, and when the sheets of paper were nearly dry, the inside of the tube was lined twice with the paper. We now followed the directions of M. Nièpce, as given in our last number, p. 291. A little water was introduced inside the tube, so as to well moisten the paper, and the excess poured out. The tube was again closed, and heated to a temperature too high to be borne by the naked hand. It was then opened directly, and applied face downwards upon a sheet of ordinary sensitive chloride of silver paper,—a piece of a handbill having previously been laid on to serve as a negative. It was suffered to remain in that position about ten minutes. The result was precisely similar to that described in our last number but one as having been accomplished by M. Nièpce in the presence of Professor Wheatstone. The circle of the sensitive paper which was covered by the mouth of the tube became visibly blackened in those parts which were unprotected by the piece of handbill, the letters on which were impressed white on a black ground, and distinctly legible. This, therefore, proves conclusively that light has nothing whatever to do with the operation, inasmuch as the *whole* of the manipulations we have described were performed at night by the light of a small lamp. The whole of the materials employed had also been kept in darkness for some time previously.

"A piece of sensitive chloride of silver paper was stretched over the mouth of a test tube, in which some pure distilled water was kept boiling; in about two minutes the paper had darkened considerably, showing that *heat* (and perhaps aqueous vapour) was capable of exerting a similar action to actinism. We have since shown that aqueous vapour is not necessary, by fastening the sensitive paper round the outside of the test tube close to the glass: it darkened in this case also, though not so rapidly as in the former experiment. A third experiment was tried as follows:—A strip of thin printed paper (torn from a handbill) was screwed close to a piece of sensitive chloride of silver paper in a pressure frame, the piece of handbill serving as a negative. The frame was now exposed for some minutes to the heat from a vessel of boiling water, and the result was a reproduction of the paper used as a negative, but in *its true light and shade*. The negative had, in fact, facilitated the absorption of the heat instead of obstructing it."

The following are the directions given by M. Nièpce de St. Victor, which are referred to by Mr. Crookes:—

"Use paper prepared with ammoniacal chloride of silver, as it is more sensitive than that prepared with chloride of silver alone.

"At the moment of opening the tube, a little water must be inserted inside in such a way as to well moisten the pasteboard, and any water not immediately absorbed must be allowed to run out; and the tube again closed, and heated over a spirit lamp until it has reached a temperature too high to be borne by the naked hand (about 150 degrees), then opened directly, and applied upon the thin paper bearing the engraving, which serves as a negative, and the results will be the reproduction of the engraving on the sensitive paper beneath.

"The pasteboard ought to be strongly impregnated with tartaric acid, and insolated for four or five hours in the month of July. Pasteboard impregnated with nitrate of uranium does not require to be insolated above an hour; but it loses the acidity communicated by the light much more rapidly.

THE DISCOVERY OF THE COMPOSITION OF WATER.

Mr. Bennett, of the British Museum, has addressed a letter to Sir Benjamin Brodie, Bart., which contains indisputable evidence in favour of Cavendish's claim to the discovery of the composition of water. The evidence was discovered by the late Robert Brown, Esq., and is not derived from any unpublished document, but forms part of a section of De Luc's "Idées sur la Météorologie," which, although specially entitled "Anecdotes relatives à la découverte de l'Eau sous la forme d'Air," appears entirely to have escaped the notice of those who have advocated Cavendish's claims. It is the more conclusive as coming from De Luc, the "*ami zélé*," as he justly terms himself, of Watt, and who, in relation to this question, believed himself "à portée d'en connoître toutes les circonstances."

The testimony of De Luc is as follows:—"Vers la fin de l'année 1782, j'allai à *Birmingham*, où le Dr. Priestley s'étoit établi depuis quelques années. Il me communiqua alors que, M. Cavendish, d'après une remarque de M. Warltine, qui avoit toujours trouvé de l'eau dans les vases où il avoit brûlé un mélange *d'air inflammable* et *d'air atmosphérique*, s'étoit appliqué à découvrir la source de cette eau, et qu'il avoit trouvé qu'un mélange *d'air inflammable* et *d'air déphlogistique* en proportion convenable, étant allumé par l'étincelle électrique, se convertissoit tout entier en *eau*.—Je fus frappé au plus haut degré de cette découverte."—*Idées sur la Météorologie*, tome ii., 1787, pp. 206-7.

The italics and inverted commas are De Luc's own.

In this communication, made by Cavendish to Priestley, the theory of the composition of water is clearly indicated. The two gases—known to have been hydrogen and oxygen—were mixed together *in due proportion*, and by means of the electric spark were *entirely converted* into water. Referring to one of Cavendish's experiments, as recorded in his Journal, Lord Jeffrey, the most candid and judicious of Watt's advocates, has said, "If he (Cavendish) had even stated in the detail of it that the airs were *converted*, or *changed*, or *turned* into water it would probably have been enough to have secured to him the credit of this discovery as well as to have given the scientific world the benefit of it in the event of his death before he could prevail on his modesty to claim it in public."—*Edinburgh Review*, vol. 87, p. 125.

The evidence which this distinguished critic and judge regarded as sufficient to establish Cavendish's claim is now afforded, not by a note in his private Journal, but by the testimony of the zealous friend of Watt, who states that it was communicated to Priestley towards the end of 1782, that is to say, several months before Watt drew his own conclusions from Priestley's bungling repetition of Cavendish's experiments. It was, moreover, published to the world and suffered to remain uncontradicted while all the parties were alive and in frequent intercourse with the author and with each other.

Mr. Bennett has felt it to be his duty as executor to the late Mr. Brown to communicate the foregoing particulars to the President of the Royal Society, by whom they have been laid before the Society.

It is a remarkable fact that notwithstanding all the researches made on many occasions during the past half-century on the claim to the Discovery of the Composition of Water, and even within the past year by eminent *savants*, the evidence published by De Luc, in 1787, remained undiscovered, with an exception, that being, as above mentioned, the late Robert Brown, Esq., and this is the more remarkable when we remember that De Luc's chapter, already referred to, is especially devoted to anecdotes on the subject in question.—*Athenæum.*

Mr. Muirhead has addressed a letter to Sir Benjamin C. Brodie, Bart., as President of the Royal Society, to show that the quotation from De Luc, given above, is far from bearing the construction which it might at first sight have been supposed to warrant; and also that it was no new discovery of the late Mr. Robert Brown. The following are extracts from Mr. Muirhead's letter (dated Feb. 28th), which we give by permission of the President:—

"It is only at first sight, and when taken in an isolated form, apart from the rest of De Luc's narrative, that the passage cited could bear the interpretation now sought to be put upon it. How unwise, as well as unfair, it would be so to view it, can at once easily be shown from the rest of the same history. Dr. Priestley's com-

munication of Cavendish's experiment is said by M. De Luc to have been made 'towards the end of 1782.' In the continuation of his narrative, De Luc then mentions the experiments of Priestley, the formation of Mr. Watt's theory of April, 1783, and Blagden's report of his communication to Lavoisier, at Paris, in June of the same year. But, in the same section of the same volume he distinctly and positively says, that when in September [1783] he returned to Birmingham, 'Nous ignorions, M. Watt et moi, que M. Cavendish eût eu des idées fort semblables aux siennes sur la Cause de ce Phénomène.'—*Idées, etc.* tom. ii., p. 224. Now, we may well ask, how could this possibly have been the case with De Luc in 1783, if Priestley's communication to him in 1782 had extended to the *conclusions*, as well as to the *experiments*, of Cavendish? Yet that is really the whole point at issue; for no one has ever denied the performance of Cavendish's *experiments* in 1781; and the communication of *them*, with the result of an equivalent weight of water (though not of any *conclusions*), to Priestley, is mentioned in Cavendish's own paper of 1784.

"De Luc adds, on the next page of his work, that 'Au mois de Juin (an evident mistake for Janvier), '1784, M. Cavendish remit à la Société Royale un Mémoire, dans lequel il joignit, au récit de ses Expériences de 1781, sa Théorie sur la formation de l'Eau.'—*Idées, etc.*, tom. ii., p. 225. Here, for the first time, in De Luc's narrative (with the exception of the allusion, already noticed to Blagden's statement at Paris, in June 1783), occurs a clear and distinct notice of Cavendish's *theory* or *conclusions*, as distinguished from his *experiments*. What M. De Luc's opinion of the Memoir was, in which those *conclusions* were announced, when he perused it in March 1784, and sent an analysis of it to Mr. Watt, is well known from his letters already published. He thought it probable that Cavendish, in his Memoir of 1784, was '*pillaging*' from Mr. Watt's prior letters of the 26th of April and the 26th of November, 1783, then unpublished, but the contents of which are admitted to have been well known both to Blagden and to Cavendish himself, for months before the reading of Cavendish's Memoir. 'Etant ici de ma lettre,' De Luc writes, 'j'ai reçu le mémoire de M. Cavendish, et je l'ai lu ! ! * * Attendez-vous à quelque chose qui vous étonnera dès que je pourrai vous écrire.'—*M. De Luc to Mr. Watt, 1st of March*, 1784. And again, 'Vos *propres termes*, dans votre lettre d'Avril au Dr. Priestley, donné pour quelque chose de *nouveau*, par quelqu'un qui doit connoître cette lettre, connue de tous les membres actifs de la Société Royale; du Dr. Blagden surtout, (puisqu'il dit en avoir parlé à MM. Lavoisier et De La Place), qui a eu pleine connoissance du mémoire de M. Cavendish avant qu'il fut lû à la Société Royale, et à sa lecture, et qui m'en a entretenu, comme je vous le disois dans ma précédente,—moi qu'il sait être votre ami zélé.'—*M. De Luc to Mr. Watt, 1st and 4th of March*, 1784.

"We are thus enabled to set against the interpretation attempted to be put on the passage in question, the most conclusive of all testimony; that, namely, of De Luc himself. For, if he had intended to say that in the end of 1782 the *conclusions* of Cavendish had along with his *experiment* been communicated by Priestley, he could not possibly have gone on to say, as he has done, a few pages later in the same volume, that in September, 1783, he was ignorant of Cavendish having entertained any such ideas. Nor would he have felt the astonishment, and entertained the suspicions, which he so strongly expresses on his perusal of Cavendish's memoir in March, 1784.

"What, then, it may be asked, did he mean, when he wrote the passage now quoted from the 'Météorologie?' The answer is obvious. He only meant, and can only have meant, to describe the mere *fact* of Cavendish's *experiment*, which is all that appears, from any other evidence in the case, to have been then known either to Priestley, or to Cavendish himself; an experiment, with its result of an equivalent weight of water, in itself doubtless a very remarkable phenomenon, or, as De Luc calls it, a 'découverte,' which greatly struck him, but which, it must always be remembered, is a very different thing from the *conclusions* which were afterwards stated *as to its cause*, by Watt, by Cavendish, and by Lavoisier.

"De Luc's account, it must also be observed, is not a contemporaneous one, published at the time when Priestley's communication was made, and before the all-important conclusions of Watt were made known. Writing at an interval of some years after his interview with Priestley, and also after the true interpretation of the experiments had been arrived at, and the cause of the phenomenon established, he

had used language, in describing Cavendish's experiment, which he could scarcely have applied to it in 1782 ; as when he says that the two gases 'se convertissoient:' the only fact then observed being the appearance of an equivalent weight of water, and the idea of conversion being as yet unsuggested by any one. M. De Luc also laboured under the disadvantage of translating Priestley's English communication into French, in which language his work was published.

"The idea that the narrative of De Luc, contained in his 'Météorologie,' remained for more than half a century unknown to all engaged in researches on the water controversy, till it was 'discovered' by the late Mr. Robert Brown, seems nearly as incorrect as the interpretation sought to be put on a partial quotation from it is evidently mistaken. I can answer for myself that, many years ago I read the whole of the narrative in question, and formed in regard to it the opinion which I have now endeavoured to state. Twice, at least, in a work published in 1846—'Correspondence of Watt on his Discovery of the Theory of the Composition of Water,' 1846, pp. liv. and lvi.—I had occasion to quote it, accompanying my quotations with particular references to it.

"If not hitherto cited by the supporters of Mr. Cavendish, doubtless it has been because they observed that any argument which it might at first sight appear to furnish on their side is only apparent ; that there can be no real question of De Luc's decision having been strongly against Cavendish ; that when the whole of the statement is considered, it leaves the case exactly where it was before, or rather, corroborates the rest of the evidence, which establishes the priority of Watt. These also, are excellent reasons why the late Mr. Brown, although often asserting that he knew of some document favourable to the cause of Cavendish, uniformly declined to produce it. * * When we find De Luc positively declaring that, in September, 1783, he was ignorant of Cavendish's conclusions, the inference attempted to be drawn in favour of Cavendish, from the terms in which at a later period De Luc describes the communication in 1782, falls to the ground."—*Athenæum.*

SAPO LARICIS.

Dr. Moore has found this soap very efficacious in the local treatment of psoriasis, eczematous affections, &c. It may be applied once or twice daily, according to circumstances, and allowed to dry on the part ; when the necessary ablutions are required, lotions of bran-water, or pure water with carbonate of soda (℥ss. to ℥i. to Oj.) will be found usually most suitable. The following is the mode of preparing it :—Take wheaten bran, ℥iv. ; white curd soap, ℥xxiv. ; pure glycerine, ℥iii. ; extract of larch bark, ℥vi. ; rose water, ℥xii. The twenty-four ounces of white curd soap are dissolved in twelve ounces of rose water, by means of a steam bath ; the four ounces of wheaten bran are infused in ten ounces of cold water for twenty-four hours, and expressed ; to the expressed liquor the three ounces of pure glycerine are added ; the six drachms of the extract of larch bark are dissolved in one ounce of boiling water ; these solutions when mixed are added to the dissolved soap. The superfluous water is evaporated by means of a steam bath, until the soap becomes of a proper consistence for pouring into moulds. The product is a soap of a dark claret colour, with rather an agreeable smell.—*Dublin Hospital Gazette.*

COMPOUND SYRUP OF PHOSPHATES, OR CHEMICAL FOOD.

In reply to a correspondent, we insert the following formula by Mr. Edward Parrish, taken from the *American Journal of Pharmacy*, vol. xxix., p. 573:—

Take of Protosulphate of Iron, ℥x.
Phosphate of Soda, ℥xij.
Phosphate of Lime, ℥xij.
Phosphoric Acid, glacial, ℥xx.
Carbonate of Soda, ℈ij.
Carbonate of Potassa, ℥j.
Muriatic Acid, } of each sufficient
Water of Ammonia, }

Powdered Cochineal, ʒij.
Water, sufficient to make, fʒxx.
Sugar, ℔iij. (troy)
Oil of Orange, ♏x.

Dissolve the sulphate of iron in fʒij. of boiling water, and the phosphate of soda in fʒiv. of boiling water. Mix the solutions, and wash the precipitated phosphate of iron till the washings are tasteless. Dissolve the phosphate of lime in four fluid ounces of boiling water, with sufficient muriatic acid to make a clear solution, precipitate it with water of ammonia, and wash the precipitate.

To the freshly precipitated phosphates as thus prepared, add the phosphoric acid previously dissolved in the water. When clear add the carbonates of soda and potassa, and afterwards sufficient muriatic acid to dissolve the precipitate. Now add the cochineal mixed with the sugar, apply heat, and, when the syrup is formed, strain and flavour it. Each tea-spoonful contains about 1 grain of phosphate of iron, and $2\frac{1}{2}$ grains of phosphate of lime, with smaller proportions of the alkaline phosphates, all in perfect solution.

THE FRENCH PHARMACIEN AND HIS PHARMACIE.

BY MR. D. H. CUSSONS.

A BRIEF sketch of these may not be uninteresting to my brethren in the profession, especially to English Assistants, who are apt to form somewhat erroneous ideas of them, providing their illusions have not been dispelled by the enlightening rays of personal experience. To the Pharmaceutist of England I would not compare the Pharmacien of France, either as a scientific or a practical man; we will suppose he is the former, knowing that he has passed an examination in order to receive his title, but to the latter he can have no pretensions; let any one, who knows the method of conducting a French business, say whether such a system would be tolerated in England! The staff of an ordinary Pharmacie consists of an assistant, a porter, and "Madame" (who sits at the counter to receive cash, to keep the books, and to overlook the aforesaid individuals). This trio manages the affairs of the day, whilst our friend the Pharmacien is taking his promenades, or lounging at a café from eleven a.m. to five p.m.; at six o'clock he dines, and at about seven he (like "the learned judge") dons the black cap, which is supposed to bespeak his sapience, and then sits behind the scenes, perusing *La Presse*, &c., his composure being but occasionally disturbed by the assistant stepping in to ask a question; thus, with him, each day passes over; and in what manner is his business conducted? You enter a Pharmacie, and are served by a porter wearing a black apron and cap ('tis quite *an event* to catch a glimpse of the principal). You send a prescription to be dispensed, probably "mixture and pills," which you receive rolled in a portion of an old journal, without an address, no seal or cap over the cork, the label written "*Potion selon la formule No.*——" (but without a corresponding No. being placed on the prescription), and a similar label for the pills; therefore, you must either take the whole quantity of each, or (if any should be left) recollect the dose until the time when they shall be again required. Fortunately, the usual preparations are not very powerful, consequently we should not apprehend any danger resulting from the patient taking three or four pills instead of one or two. I must not now trespass further on your columns, but allow me to add, I have not chosen an isolated case to portray, this is merely a faint type of the instances which are but too general in Paris. Of course, I do not include the English Chemists here—their businesses are conducted on English principles, and show a pleasing contrast with the French.

Rue de Buci, Paris, April 15, 1859.

[We have published several accounts of the state and progress of Pharmacy in France, and the mode in which the business is conducted in that country, giving rather a different view of the case from that above indicated. It is proper to look at both sides of the question, but, while we do not dispute the statement, that establishments, such as those described by Mr. Cussons, may exist in some populous districts, or the suburbs of Paris, or in the small towns, the description must not be received as giving a correct notion of a French Pharmacie as usually met with. We

are acquainted with many of the regular and well-known Pharmacies in Paris, which might be cited as examples of scientific skill and accuracy, and afford evidence of the advantage of professional education.—Ed.]

THE LEAD PANIC AT HASTINGS AND ST. LEONARDS.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—In the *Pharmaceutical Journal* for April, you have commented somewhat facetiously on what you are pleased to term "The Water Panic at Hastings," and in which I am made to sustain a rather prominent character. Now I can have no earthly objection to your amusing the members of the Pharmaceutical Society (amongst whom I have the pleasure of numbering many valued friends) at my expense, but I must, as a matter of justice, ask your permission to give *my* version of the affair.

In November last, I called the attention of the authorities to some cases which had occurred in my practice, of illness which had undoubtedly arisen from drinking water contaminated with lead. I called their attention to the fact that a great number of the tanks used in this town are composed of lead, and suggested that power should be sought to compel owners of houses to change their leaden tanks for others. Now, Sir, this was a subject of a very important character, and one, in my mind, which should never have been brought before the general public.

Time rolled on, and at length, at the beginning of December last, the turncock, or whatever he is, called on me and asked me the names of my patients, and the houses where I had found leaden water; this I considered a matter for private investigation only; delicacy to one class, and justice to the other, made such a revelation *to him* out of the question, but I sent a message by him to the Water Committee, which was then sitting, that "if any one of their body would call upon me, I would show him the specimens of water I had analyzed, tell him *where* I had obtained them, and give him every information in my power." Another officer of the corporation made a similar application for information, which I refused to give in the absence of any fair or legitimate scientific court of inquiry to which it could be applied. Early in January I was told that the Medical Society of this town had been asked by the corporation if they had met with any cases of lead poisoning from water, that they answered in the negative, and there, as I understood, the matter ended.

Now, Sir, conceive the profound amazement of myself and friends, when we heard on the 16th of March that the Medical Society of this town had been engaged for nearly eleven weeks in analyzing water from various sources, and investigating the subject of my allegations,—that they had published a printed report, which had been in private circulation several days, and all this perfectly unknown to me and without having the slightest communication with me on the matter in question! This report, as you may suppose, criticized me in no measured terms, and ended in the hetereogeneous verdict, that "the water of Hastings had no affinity for lead." Now it is a fact that the leaden tanks and leaden pipes of Hastings require frequent renewal; and Dr. Taylor, the analyst on the occasion, ought to know that, as Dr. Medlock has shown, water will act upon lead at one time of the year, and may not at another.

Dr. R. D. Thomson analyzed for me two specimens of water obtained from leaden tanks in autumn, and found lead in each; Dr. Taylor analyzed water obtained from other sources—obtained in the end of January, and declared that he could find no lead in any of the specimens sent him by the Medical Society.

I put it to you, Sir, whether this looks like a search after a scientific truth, or after some other object, which I will leave your readers to designate. This Medical Society, during their three months' investigation, never thought it necessary to communicate with me, but they adjudicated on my statements in the entire absence of those facts which I alone could furnish, and published a report denying my allegations, and resting entirely upon their unsupported and secretly obtained evidence. Will any one believe that these gentlemen, who had been at work behind the scenes for nearly three months, and repudiated in their report all that I had stated respecting leaden tanks and lead poisoning, actually make in that report the following two admissions: first, that out of 166 tanks in the small parish of St. Clement,

Hastings, 114 are composed of lead; second, "one member of our Society has recently met with one case of lead poisoning by water in a phthisical patient." Two other cases of lead poisoning from water have also recently occurred at Fairlight, a village adjacent to Hastings. Why, Sir, the Medical Society had laboured for three months in denying every statement I made, yet actually corroborating every fact. I have the honour to have had some success in my profession, I am not a member of the Hastings Medical Society, I am not a medical alderman, and now I ask you and your friend the prophet Jonah, whether, if I had been a doctor practising here without a patient, you, or he, or the public either, would ever have heard one word on this matter?

I have the honour to be, Sir, yours most obediently,

Hastings, April 21st, 1859. C. B. Garrett M.D.

SALE OF POISONS IN FRANCE.

In the course of trial of a woman, named Galabbé, condemned to hard labour for life for having poisoned her husband by tartar emetic, it was shown that she had employed two female servants to purchase the tartar emetic in small quantities from no less than twelve druggists, who did not require the production of a prescription. These druggists were now prosecuted, and seven who were convicted fined 100 francs and 50 francs each.—*Lancet*, April 2nd.

DEATH FROM AN OVERDOSE OF CHLOROFORM.

On Tuesday, April 12th, Mr. Wakley, coroner for West Middlesex, attended at the Prince Albert Tavern, Kensington Park Road, to investigate the circumstances attending the death of Dr. Robert Mortimer Glover, aged 42, late physician to the Royal Free Hospital, and the author of several able medical works and papers, which melancholy event took place through an overdose of chloroform. Joseph Millar, on being examined, stated that he lived at 7, Tottenham Street. He knew Dr. Glover well, and was with him when his death took place on the evening of the 9th instant, about half-past 7, at the deceased's late residence, 1, Kensington Park Road. He had been with the deceased the whole of the day. With the exception of saying "Yes" or "No" once or twice while friction was being applied, the deceased continued insensible up to his death. Dr. Hopton was in attendance upon him, and besides friction, hot flannels were applied, and other remedies resorted to. Mr. Walter M. Rochfort was the next witness called, who stated that he was a Chemist, and lived in Kensington Park Road, where the deceased resided for the past twelve months. On Friday evening he was called to the deceased by Mr. Gant, a friend of the unfortunate gentleman. The deceased at that time was comatose—he could not speak. He had known the deceased previously, from having taken large doses of opium, to be in a partially insensible state. The deceased, on such occasions, said that he took the opium for attacks of dysentery, and so forth. He had also known the deceased take doses of chloroform or chloric ether; at least, he said that he did so. The deceased was given to intemperate habits, but he had known him to be a month without being intoxicated. He dined with him (witness), and he said he was obliged to take opium and stimulants, because of his having suffered severely from dysentery while in the East. He never said anything about suicide, and he (witness) believed he was of a very different disposition than to commit suicide. He was married about six weeks ago. After his marriage he did not seem altered or depressed. There was a separation between the deceased and his wife about a week after their marriage, and she was at present an inmate of Colney Hatch Lunatic Asylum. The evidence of Mr. Gant, one of the surgeons of the Royal Free Hospital, went to show that deceased had taken an overdose of chloroform, when only intending to take it as an anæsthetic. The Coroner concurred in this opinion, and the jury, after some deliberation, recorded that the deceased died from the mortal effects of his taking an excessive quantity of chloroform as an intoxicating agent, and not with the view of destroying life, or of doing himself personal injury.

POISONING BY ESSENTIAL OIL OF ALMONDS.

On Tuesday afternoon, April 12th, an inquiry was opened, at York, touching the death of Anne Maria Smithson, a child 15 months old, daughter of Mr. Smithson, landlord of the Fat Ox Inn. It appeared that the parents had administered to the child a teaspoonful of a mixture consisting of essential oil of bitter almonds and syrup of violets. This, it seemed, had been furnished in mistake by a young man named Taylor, assistant to Mr. Bowman, Druggist, Fossgate, instead of what was asked for, and what the label on the bottle indicated—oil of sweet almonds and syrup of violets. From the evidence, it appeared that the father of the deceased took a bottle labelled "Oil of Almonds and Syrup of Violets," to Mr. Bowman's, and was served by the assistant Taylor. A teaspoonful of this mixture was given to the child, who died in about a quarter of an hour after taking the dose. Mr. S. W. North, Surgeon, made a *post-mortem* examination: he noticed a strong odour of essential oil of almonds, but nothing in the internal or external appearance of the body to account for death. An analysis of the contents of the stomach was made by Mr. W. Procter, Surgeon, which proved the presence of prussic acid to the extent of three-quarters of a grain, or about fifteen drops of medicinal acid; the contents of the bottle from which the dose had been taken was found to consist of essential oil of almonds and syrup of violets.

Mr. W. Bowman, Chemist, produced three bottles from his shop, containing essential oil of almonds, oil of sweet almonds, and syrup of violets; he described the arrangement of his shop, and stated that the essential oil of almonds was kept on a high shelf, and could not be reached without a stool or chair. His assistant had been with him about a week, but had been in the drug business about five years.

The Coroner, in his address to the jury, said he thought it would be a considerable improvement in the mode of conducting Druggists' shops, if bottles containing poison were labelled in plain letters to that effect.

The jury, after an absence of an hour and a half, returned a verdict of "Accidentally poisoned," and appended to their verdict the above suggestion of the Coroner. Taylor was then, at the request of the jury, reprimanded by the Coroner, and the proceedings terminated.

OBITUARY.

DEATH OF LASSAIGNE.

This eminent Chemist died on the 18th of March, in his fifty-ninth year.

Born of honourable parents, but without fortune, M. Lassaigne commenced his career as a chemical assistant in the laboratory of the Museum of Natural History, where he replaced M. Chevallier. After having worked under MM. Vanquelin and Laugier, he was appointed to succeed M. Dulong as Professor of Chemistry and Physics to the Imperial Veterinary School of Alfort. He was successively named corresponding member of the Imperial Academy of Medicine, member of the Society of Pharmacy, of the Society of Medical Chemistry, and of the Society of the Friends of Science. He was one of the original editors of the *Journal de Chimie Médicale*, and also of the *Annales d'Hygiène;* he has published a *Dictionnaire des Réactifs*, a *Traité de Chimie*, and a great number of papers which have been inserted in the scientific Journals. M. Lassaigne has left a widow, a son, and a sister.

REVIEW.

On Poisons, *in Relation to Medical Jurisprudence and Medicine*. By Alfred Swain Taylor, M.D., F.R.S., &c. Second edition. Small 8vo., pp. 863. Churchill.

The reputation deservedly enjoyed by the first edition of this work, supersedes the necessity for a lengthened notice of it on the present occasion. Much has been done lately in the theory and practice of poisoning, and the numerous interesting and intricate cases which have occurred, furnish much new matter for such a work. It has, therefore, been necessary to curtail some of the less important portions, confining it more strictly to those substances which, from the frequency of their use

for murder or suicide, are likely to become subjects for medico-legal investigation. "A work treating of every substance capable of having a noxious action on the animal body, would," as the author observes, "become a catalogue of drugs," as "the greater number of poisons are useful medicines when properly employed, and nearly every substance in the catalogue of medicines may be converted into an instrument of death if improperly administered." In reference to the new matter introduced, he says "the requirements of a period, dating no longer ago than ten years, are different from those of the present day; and it is the duty of an author, so far as it may be in his power, and consistent with the scope of his labours, to fulfil these requirements by an entire remodelling of his subject."

If the present mania for discussing the sale of poisons, and contriving poison bills, should continue, we may expect the public to become more and more enlightened on the subject. The difficulties thrown in the way of the purchase of arsenic by the Sale of Arsenic Act, have, we are informed, led to the substitution of other poisons in many instances for criminal purposes; and, in proportion as these are placed under surveillance, others will be brought into use, until the science of poisoning has arrived at an intricacy and complication hitherto unexampled. In such case we may expect the next edition of the work before us to be considerably enlarged.

Dr. Taylor's is a very useful work for the student. The price is moderate, and it contains, in a small compass, a large amount of practical information relating to the chemistry of poisons, the mode of detection, their mode of operation, and the questions likely to arise in medico-legal investigations.

TO CORRESPONDENTS.

A Subscriber (San Fernando Dispensary).—A diploma from the "Trinidad Medical Board" would confer no privilege or distinction in this country.

"*Liq. Opii Sed.*" (Southampton).—The subject is one of considerable importance, and will receive attention; the communication will be kept for reference at some future time.

J. B. (Islington).—When boiling water is poured upon crystals of bicarbonate of potash, a portion of the carbonic acid is given off.

"*Orwell*" (Sheffield).—*White Gutta Percha.* Vol. xvi., p. 142.

Pharmaceutist (Cardiff).—*Silvering the interior of bottles.* In a four-ounce bottle, dissolve four grains of nitrate of silver in a little distilled water, add a few drops of liquor ammoniæ; continue the addition of ammonia, drop by drop, until the precipitate is redissolved, then nearly fill the bottle with water, and add ten drops of oil of cloves, pimento, or cassia, dissolved in four drachms of spirit of wine. In a few minutes the silver will be precipitated on the inner surface of the bottle.

D. D. (Liverpool).—The British Pharmacopœia will be published in the English language, with the list of the Materia Medica and compounds in the Latin language.

E. S.—Want of space obliges us to omit the letter, especially as the suggestions it contains have already been published.

Mr. Harwood (Putney), *Mr. Jones* (Newent), are thanked for their communications.

D. S. M. (Bath).—(1.) In making *Spiritus Ammoniæ aromaticus*, according to the Pharmacopœia, the spices used do not yield so much essential oil as is often used when the oils, instead of the substances, yielding them are distilled with the spirit. It is the separation of these oils that causes the turbidity on the addition of water. (2.) Treat the ointment with nitric acid to destroy the fat, and then precipitate the mercury.

Instructions from Members and Associates, respecting the transmission of the Journal, before the 25th of the month, to the Secretary, Elias Bremridge, 17, Bloomsbury Square, W.C.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington St. Other communications to the Editor, 15, Langham Place.

THE PHARMACEUTICAL JOURNAL.

VOL. XVIII.—No. XII.—JUNE 1st, 1859.

TERMINATION OF THE EIGHTEENTH VOLUME OF THE PHARMACEUTICAL JOURNAL.

The *Pharmaceutical Journal* was commenced as an experiment. The first six numbers, under the title of "Pharmaceutical Transactions," were printed chiefly for gratuitous circulation among Chemists and Druggists throughout the kingdom, for the purpose of making generally known the nature, objects, and constitution of the Society which was in process of formation. The first number contained the programme or prospectus of the Society, with some explanation of the circumstances which had led to it; a comparison between the unrecognized and disunited condition of the Pharmaceutical body in this country, and the superior scientific and professional status enjoyed by our brethren on the Continent, and also to some extent in America. Each succeeding number contained a further elucidation of the subject, with answers to objections and inquiries, reports of meetings, and scientific papers. Before the expiration of six months, the foundation of the Society was laid, and it was decided that the monthly periodical should be continued, under the more comprehensive title "*Pharmaceutical Journal*," and that it should be furnished, free of charge, to each member and associate, the Council purchasing the requisite number of copies for that purpose.

By the assistance of the Professors of the Society, and by contributions from other scientific men, the Journal gradually acquired a respectable position among scientific periodicals, at the same time that it was the province of the Editor to adapt the subject matter, as much as possible, to the capacity and requirements of the class for whose benefit and instruction the work was especially designed, namely, Chemists and Druggists, their assistants and apprentices. Some time was required to bring about such a change of habit and of thought as to awaken an interest in a scientific periodical among those who had been taught their business as a mechanical art, or ordinary trade, and had an idea that science was unnecessary, and calculated rather to interfere with the regular course of business. It was one object of the Journal to demonstrate, by an appeal to facts, by noticing each passing event that could serve as an illustration, and by a series of editorial articles elucidating the several points briefly referred to in the original programme, to pave the way for the revolution which the introduction of the improved system of education was calculated to produce. With this object, the state of Pharmacy in each nation in Europe and in America, successively came under review, and at suitable intervals the progress of Pharmacy in Great Britain was noticed. Provincial Transactions have always occupied a prominent place in the Journal, and every endeavour has been used to promote and assist in the establishment of local branches of the Society, with meetings, lectures, and such means of instruction as the capabilities of the place would afford. It was also a function of the editorial department to visit the principal towns in England and Scotland, attending anniversaries, when opportunity occurred, thus giving encouragement to the proceedings, and at the same time promoting unity of action by suggestions founded on experience in other localities. It has often been found that considerable effect is produced by personal communication on such occasions. Difficulties are discussed, doubts cleared up, explanations take place more satisfactorily than by correspondence, sometimes personal asperities are smoothed over, the business terminates with a social meeting, an active committee is appointed, and a full report being published in the Journal, some encouragement is given to the members in other places where similar proceedings are in contemplation or in progress. Some of these movements are more permanent and successful than others, according to the zeal and energy of those who take the most active part;

but all contribute, more or less, to the general advancement of the Society, and may in some instances sow the seeds of emulation among young men, the result of which time will make manifest.

The work proceeded gradually but favourably. Sometimes in one place, sometimes in another, a few lectures were delivered, or a reading-room was formed, or the Members met at each other's houses periodically for mutual improvement; in some places the hours of business were shortened to give the young men more time for study, and from all quarters letters of inquiry were addressed to the Editor on the subject of the books recommended for students, and the best mode of preparing for the examination. These communications were answered sometimes by post, but not unfrequently in leading articles in the Journal, for the general information of the parties concerned. By such means the number of students increased, as well as the number of candidates for examination, and the Board of Examiners were enabled from time to time to amend their regulations and extend the course of education. It formed an important branch of the editorial department to watch over these local proceedings, and to encourage them, either by correspondence, or by visiting the places, attending meetings or committees, and assisting in the arrangements. Such co-operation had a double advantage, for while it extended to the members in each locality the benefit of the general experience of other places, it gave the Editor a complete insight into the state and requirements of the trade in different parts of the country, and an acquaintance with the habits, general character, and position of the members, among whom many became valued and intimate friends, and also zealous supporters of the Society and the general advancement of Pharmacy. Thus the Society is represented by the most intelligent and well-informed Chemists in almost every town of importance in the kingdom.

The occasional appearance of obnoxious or absurd Bills in Parliament afforded a favourable opportunity for demonstrating the connecting link between the personal interests of the Members, and their identification with a Society established for educational purposes and professional advancement. It has been a principle invariably upheld in the editorial articles, that whatever claims the Society may put forward for recognition, or special privileges, must be founded on MERIT. The protection of vested rights and interests is a fundamental doctrine in the law of the land, and for ensuring this object the union of those who have interests in common, is an act of self-defence—a sort of instinct of human nature. But the Pharmaceutical Society, in addition to the strength and influence proverbially derivable from unity, stands on higher ground as an institution founded for the purpose of carrying out a great public improvement, and requiring, as a matter of justice, an acknowledgment of such services, either in the form of some honorary distinction founded on merit, or additional powers and authority to extend still further the beneficial influence of the professional improvement, which on the voluntary principle can only be effected within certain limits. Taking as the text the original article "On the Constitution of the Pharmaceutical Society of Great Britain," read at the first Pharmaceutical Meeting, May 11th, 1841, and published in the First Volume of this Journal, page 4, the succeeding editorial articles up to the present time have been intended to elucidate the several points or propositions comprised in that article, each passing event or step in the progress of the Society being taken advantage of to illustrate or confirm the line of policy uniformly adopted and recommended.

The modifications of the views of the Members of the Society respecting counter-practice, is an example of the influence thus brought to bear on a practical question. In 1841, and prior to that date, the question of counter-practice was a great bone of contention between Medical Men and Chemists. Much jealousy and many disputes prevailed. Nothing would satisfy the medical reformers but the suppression of medical advice or counter-practice by Chemists under severe penalties. The Chemists claimed the "privilege" as a right, and

resisted any kind of interference. By degrees, the merits of the question having been calmly and temperately discussed in the Journal, a better understanding between the parties was the result, the jealousy between the two classes has greatly subsided—in many localities it has ceased. Medical Men admit the impossibility of shutting the mouth of the Chemist when a customer asks a question as to the properties or mode of administering a medicine, or prohibiting him from recommending an aperient draught or a tonic mixture.

The Chemists also admit that, except in trifling cases, or with regard to general information as to the doses of medicines, they are going rather out of their province in giving advice, and while they are advocating the principle that persons ignorant of Pharmacy ought to be prohibited from carrying on business as Chemists and Druggists, they cannot in fairness ask or desire for themselves a licence to practise medicine without the requisite qualification. It has become a rather prevalent idea, in which we fully concur, that counter-practice, instead of being a desirable *privilege*, is rather an inconvenient *responsibility*, and the mutual desire is gaining ground between Medical Men and Chemists, to separate as much as possible the two functions, Medical practice and the practice of Pharmacy.

The proceedings in reference to obnoxious Bills, threatening to interfere injuriously with Chemists and Druggists, and also the occasional severity and harshness in the construction of existing laws, have furnished frequent opportunities for official correspondence among the Members, and topics for articles in the Journal, which spread over a series of years, have formed links in the chain of evidence, and argument, leading from the first proposal to form an association, up to the present time. The general principles of legislation on the subjects referred to having been freely discussed and minutely explained in this Journal, are better understood, and more unity of sentiment prevails on some important questions, which we may hope sooner or later to see satisfactorily settled.

The discussion of such subjects in the Journal, especially when accompanied with the prospect of any new law relating to the qualification of Pharmaceutical Chemists, has uniformly been observed to give an impetus to education by rousing the activity of students. But, as an untimely frost in spring nips the early blossoms and destroys the hope of the expected harvest, so the withering influence of Government cold water, thrown upon the labour of years, and treating with supercilious indifference the progress already made by voluntary exertions, blights for a time the fervent hopes of the most sanguine, and discourages the rising generation, who are greatly influenced in regard to their studies by the regulations—existing, or prospective—by which they will be required to enter their profession.

Several editorial articles have appeared in recent numbers of the Journal which were written for the express purpose of placing the question of qualification in all its bearings in the strongest possible light. Throughout the eighteen volumes, the same policy and line of argument have been maintained. Each object originally contemplated has been to a greater or less extent carried into effect. All that remains to be accomplished is the more direct recognition of the Society by Act of Parliament, by such an extension of its powers under proper control, as may enable it to bring to an early and successful completion the work which has already made satisfactory progress, by which means Pharmacy will be fully established in its proper position, in the hands of persons duly qualified and entitled to the confidence of the public.

The Editor having been for a considerable time suffering from a pulmonary disorder attended with debility, and loss of voice, feels that it will be necessary for him, at no distant period, to relinquish the responsibility of the management of the Journal. Should his anticipation in this respect be realized, it is his intention to place the Journal more directly under the control of the Council, and arrangements have been made with this object.

WEIGHTS AND MEASURES.

The first question on which any difficulty has arisen between the three Colleges in reference to the British Pharmacopœia, has been the adjustment of the weights and measures. On this subject unanimity was not to be expected. The adoption of Avoirdupois weight by the Dublin College occasioned the necessity for a change; and the Dublin system not being popular in England, it therefore appeared likely that the Edinburgh College would have occasion to give a casting vote, unless a system differing from either of those in use, and mutually satisfactory, should be suggested. The plan proposed by Dr. Wilson being an approximation to that of the Dublin College, prepared the way for an assimilation in that direction, and when the representatives of the Colleges met in London, the question between Edinburgh and Dublin was almost settled, and it remained to be seen whether London would acquiesce, or whether it should be put to the vote and decided by the majority.

The Pharmaceutical Society having been officially consulted on this, as well as other questions relating to the Pharmacopœia, a Special Meeting was held on the 4th of May for that purpose, a report of which will be found in another part of this number. This meeting was not attended by any of the representatives of the Medical Council from Edinburgh or Dublin, and the unanimous decision of the meeting was against the proposed change. Dr. Wilson, on being informed of this result, expressed a desire to confer with some of the Members of the Society on the subject, and on short notice an appointment for that purpose was made for Saturday morning, the 7th, when several of those who had taken a leading part in the meeting on Wednesday evening were present, and a rather animated discussion took place. Dr. Wilson's arguments were admitted to have some weight, and disturbed the unanimity of the London members, but on coming to a vote a majority were in favour of a resolution confirming that of the previous meeting, and objecting especially to the alteration of the value of the grain. The main ground of this objection was the inaccuracy which must inevitably result from the confusion between the two kinds of grain, an inconvenience which would last for years—in fact, as long as any prescriptions of the present date are in use. In reference to the *principle* of accuracy which the London Chemists advocated, and the natural effect of the notion that a tenth of a grain is not important, Dr. Wilson said that was rather a question for the Physicians to consider than for the Chemists, and if they were willing to take the responsibility on themselves, the dispensers of prescriptions would simply have to comply with the decision. The responsibility of the *decision* will of course rest with the Medical Council, but the Pharmaceutical Society having been officially consulted, is also under a heavy responsibility, and is bound to give an unbiased and candid opinion, founded on practical experience, as to the probable influence of any proposed change, and also as to the convenience in manipulation, a duty not devolving on the Physician, but one which the Chemist is expected to perform with accuracy and a strict attention to instructions received. If the Society had failed to give a full and candid expression of opinion as to the probable inconvenience or danger of the proposed change, then the Society would have been responsible for such results, if they should arise. As the case stands, the Society has been appealed to on the subject, and after very mature deliberation has arrived at an almost unanimous conclusion.

It now rests with the Medical Council to weigh all the opinions and suggestions which have been received, and decide accordingly, for which decision the said Medical Council will be responsible. Whenever the final decision is published, and has become the law of the land, it will be the duty of all parties, whatever may have been their previous or preconceived opinions, to comply with the instructions contained in the Pharmacopœia as nearly as they can, and to use their endeavours to diminish the inconvenience as much as possible. That some inconvenience will exist is inevitable—and probably some danger.

For years to come the grain weights will be involved in confusion, and with all the care that could be bestowed on the adjustment between old and new prescriptions, the cases where the old weights are intended and where the new, taking also into account the danger of mixing the two kinds of weights in the scale box, a Chemist would be a bold man who would dare to inscribe in his window "Prescriptions Accurately Prepared." The word CAREFULLY might with propriety be substituted, and in this respect the Chemist cannot be too much on his guard; for the amount of care must have some reference to the difficulty and delicacy of the task to be performed. It is freely admitted that any change whatever must be attended with inconvenience; it being also admitted that the existing discrepancies in the weights and measures are objectionable and cause much confusion, the right question for consideration is what change could be contrived to rectify the existing defects with the least possible inconvenience? It can scarcely be denied, that by retaining the Troy grain and altering the ounce and the pint, the difference would be more easily calculated, estimated, and acted upon, than it would in the case of the alteration being made in the fraction of the grain, a quantity almost unappreciable, invisible, and practically incapable of being adjusted correctly in the manipulations of the dispensing counter, and, nevertheless, sufficiently important to deserve serious consideration on the broad principles of chemical accuracy.

DIVIDED RESPONSIBILITY IN THE SALE AND USE OF POISONS.

THE serious disaster at Berwick, for which a verdict was given against Mr. Elliot with £1400 damages, as the vendor of a quantity of sheep-wash, has given rise to much alarm among the vendors of compounds of that nature, and we have received numerous letters with inquiries as to the best mode of guarding against such misfortunes, or escaping liability in the event of mischief arising from the use of these poisonous compounds by other persons.

Several printed bills have been forwarded to us, in which the wash is represented as a strong poison, containing arsenic, and requiring the most careful attention to the instructions given, even in the most minute details. Very precise information is given respecting the most probable sources of danger, with instructions for avoiding such casualties. These several hints and suggestions are printed in a prominent style in black Egyptian letters, and some of the more important precautions are repeated in different parts of the handbill. On the other hand, the efficacy of the composition when used strictly according to instructions, is described in strong terms, and thus the purchaser is made fully aware that he is about to use a most deadly and dangerous substance, the value and efficacy of which may be considered, if the representation be correct, more than sufficient to counterbalance the risk. After due deliberation, knowing the value of his sheep, being obliged to apply some remedy for the disease and vermin, and being acquainted with no remedy at all to be compared to the arsenical sheep-wash for its efficacy, he decides to give it a trial, or, having used it before, he is induced to repeat it, resolving, of course, to adopt every possible precaution, and hoping by this means to escape accident.

The process of dipping several hundred sheep is rather a formidable operation, requiring the assistance of several persons, each one of whom must not only understand, but strictly adhere to the instructions. The proprietor of the sheep may use every possible precaution, but some of his men may be careless, either allowing the head of the sheep to be immersed in the wash, or imperfectly draining the excess of liquid from the fleece, or from some other oversight or accident. In a large majority of cases no such casualties occur, for it is not rational to suppose that sheep-owners would persist in using a compound if experience had shown that it was the source of repeated accidents and heavy loss. The aggregate of the reports from farmers and flockmasters throughout the country would lead to the conclusion that the arsenical sheep-wash surpasses

every other remedy in efficacy, facility of application, and economy, and that when carefully used according to the rules laid down, the risk of accident is so small as to be scarcely worthy of consideration. At all events, a full acquaintance with the nature of the substance, and all the casualties contingent upon its use, does not deter the owners of sheep, whether in flocks of thousands or hundreds, from using the arsenical wash as regularly as the season comes round when the state of the sheep requires it.

This being a fair statement of the facts as a general rule, we have a few exceptional cases on which a question arises as to the responsibility in the event of a disaster. Supposing the directions to be as clear and explicit as those to which we have above referred, it is obvious that the purchaser and the vendor are equally well informed as to the deadly nature of the compound, and the casualties to which it is liable.

The Chemist having carefully labelled every parcel or package of the compound with the full printed directions, delivers the same to the purchaser, who, according to every principle of justice, should henceforth be responsible for the result. In the Berwick case the purchaser had not previously used the sheep-wash, and depended for his information respecting its nature on the statement in the advertisement, and the instructions given by the vendor as to the mode of employment and the precautions to be taken. The merits of this case depend on the question whether these instructions and precautions were sufficiently explicit, and we were rather surprised to observe that the Editor of the LANCET *assumes* that they were not so, and therefore arrives at the conclusion that the Chemist was fairly held responsible, and is justly required to pay £1400, as a penalty for not having repeated with sufficient emphasis, and a sufficient number of times, the fact that the compound contained a deadly poison, ARSENIC, in capital letters, and "be particularly careful."

Beyond the instructions and cautions above referred to, and which in substance are usually contained in the printed directions for the use of sheep-wash, the only additional safeguard which occurs to us is a statement, to the effect that "the vendor will not be responsible for the result of any accident or mischief arising from the use of the compound, unless he or some person on his behalf be present when the wash is used." Such statement might in some instances cause a timid purchaser to hesitate in running the risk, and it might be proper to qualify it by the general assertion, which is perfectly true, that when carefully and judiciously applied, it is not only very efficacious, but unattended with danger, and when accidents occur, they may be attributed to carelessness or some deviation from the instructions.

Without some disclaimer of responsibility of the kind here suggested, the vendor is always under this disadvantage: having no witness on his side, he has no means of refuting any statement that may be made on the other, and he might be convicted on the testimony of the parties whose culpable carelessness or negligence was the sole cause of the accident.

Some correspondents have suggested that the case of Mr. Elliot should be taken up by the Pharmaceutical Society, with a view of raising a subscription or assisting in the defence in anticipation of a new trial. This would be irregular. Even if it were proper for the Society to interfere in such a case, the party is not a member, and, therefore, has no personal claim. So far as the principle of the case is applicable to the trade generally, it is a proper and legitimate subject for discussion, and on this ground we have given the particulars at some length, including the reports of Dr. Macadam and Mr. Gamgee, with such comments as the circumstances appeared to require. In a case which occurred a few years ago, the defendant was a member of the Society; the verdict against him was very severe, and caused considerable pecuniary embarrassment. The Council on that occasion voted a pecuniary donation from the Benevolent Fund, which was an acceptable relief in the time of need.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

AT A MEETING OF THE COUNCIL, *4th May*, 1859,

Present—Messrs. Bell, Bird, Bucklee, Davenport, Deane, George Edwards, J. B. Edwards, Hanbury, Meggeson, Morson, Peacock, Sandford, Squire, and Waugh, the following were elected

MEMBERS.

CARLISLE .....Hallaway, John
CALIFORNIA .....White, Robert
HERTFORD .....Judd, William
LONDON .....Bishop, Alfred
" .....Pettifer, Edmund Henry
" .....Young, William Herbert
NOTTINGHAM.....Atherton, John Henry
WAKEFIELD .....Place, William Thomas

18th May.

Present—Messrs. Ballard, Bell, Bird, Bottle, Brew, Bucklee, Davenport, Deane, George Edwards, J. B. Edwards, Hanbury, Hollier, Macfarlan, Meggeson, Morson, Peacock, Sandford, Squire, and Waugh.

PHARMACEUTICAL MEETING.

Wednesday, May 4, 1859.

MR. SQUIRE, IN THE CHAIR.

THE following

DONATIONS TO THE LIBRARY AND MUSEUM

were announced:—

The Photographic Journal, from the Photographic Society.
Journal of the Society of Arts, from the Society.
Journal of the Linnean Society, from the Society.
Journal of the Botanical Society of France, from the Society.

The CHAIRMAN stated the object of the meeting, which had been specially convened for the purpose of considering the propositions lately made with reference to the weights and measures to be used in the new Pharmacopœia. Until the year 1850 the three Colleges had agreed in using the same weight, namely, the troy or apothecaries' weight, but in that year the Dublin College introduced the avoirdupois and rejected the troy weight, which, however, was still retained by the English and Scotch Colleges. Dr. Charles Wilson, of Edinburgh, had recently advocated the general substitution of avoirdupois for troy weight in medicine, and to adapt it for this purpose and render it consistent throughout, he had proposed to create an avoirdupois grain, 480 of which should be contained in the ounce. The ounce by weight and ounce by measure would thus be equalized, as also would be the grain and minim. Mr. Jacob Bell had some years ago proposed to equalize the weights and measures used in medicine by making the weight of a fluid ounce equal to an ounce troy. This would have the advantage of facilitating the comparison of the weights and measures used in medicine with the French gramme and cubic centimetre. If Dr. Wilson's proposition was adopted, such a comparison could not be so well made; still the equalization of the weights and measures would certainly be an advantage. He (Mr. Squire) had proposed that no change should be made in the weights used in medicine until a change could be made to the French

metrical system, and with the view of promoting and preparing for this change, he recommended that in the formulæ in the new Pharmacopœia, after expressing the quantities in troy weight, there should be a separate column in which the quantities should be expressed according to the metrical system. Propositions had been made by Mr. Griffin and Mr. Warington for decimalizing the avoirdupois weight, but as this would involve the learning of new terms and new numbers, he thought the time required for that purpose would be better employed in learning the *true* decimal system, the metrical.

There were two things then before the meeting, between which they had to choose; on the one hand, the proposition of Dr. Wilson for adopting a modification of the avoirdupois weight, and on the other hand, the proposition which he (Mr. Squire) had made, to keep to the present weights and measures, and to place in a separate column in each formula in the Pharmacopœia the corresponding weights according to the metrical system. Dr. Wilson's proposition, if adopted, would render it necessary to change all the weights at present used in dispensing, and it would also necessitate the careful noting of the dates of prescriptions, so that those written before the change should be prepared with troy weights, and those written after the change with avoirdupois weights. It would be for the meeting to consider whether the proposed novelty was worth the trouble it would give to all except the Irish.

The following remarks by Mr. Bell, the President, were read:—

"Much inconvenience would arise from a change in the grain. It has been said that the difference would be scarcely a tenth of a grain, and that this would be of little or no consequence.

"If the principle be once admitted on the authority of the Medical Profession, that a tenth of a grain is of no practical importance, it is impossible to foresee where this notion of licence may end. We hear of an apprentice boy boasting that he has only been in the business three months, and he can *guess* calomel already. To such a youth it would be useless to talk about accuracy in chemical manipulations, if he could appeal to the authority of the profession to show that a variation of *ten per cent.* is not considered important. As long as any prescriptions written under the old system exist, the only choice would be between extreme inconvenience, or the sacrifice of the principle of accuracy. Either the dispensing Chemist must keep old grain weights for old prescriptions, or in every case he must calculate the difference in fractions of a grain, before he can prepare a box of pills accurately. Failing this, each pill or each dose of medicine would contain only nine-tenths of the quantity intended; and, any medical men who commit themselves to the opinion that such difference is *unimportant*, must take the responsibility of the moral influence of this careless mode of manipulation on the dispensers of medicine generally.

"Any alteration giving a new value to an old term, must of necessity give rise to mistakes, and in some instances the result might be dangerous. The 16oz. pint, although legally obsolete, is still sometimes used, partly because it is more convenient for calculations than the 20oz. pint, and partly because the habit of considering a pint as 16oz. has not been overcome by many practitioners of the old school. The same principle applies to the gallon, and in some laboratories the quantities used in the several preparations are still calculated according to the old system.

"Since any change must inevitably be more or less inconvenient, it is desirable to adopt such proposition as may reduce the inconvenience as much as possible. By retaining the troy weights up to the ounce, and making them applicable to fluids, the measure chiefly affected would be the fluid ounce, a change less serious than that of the grain, because the ounce is less frequently in use, the difference would be more easily allowed for in practice, and the grain weight is the one chiefly employed in the most delicate manipulations. The pound and pint being already involved in a confusion which could not easily be made worse

than it is, the adoption of the 16oz. pint (or pound), and eight pints to the gallon, would be attended with very little difficulty. This also would not interfere with the gradual introduction of the metrical system, in which all the names as well as the quantities being distinct, no confusion could arise. Each practitioner could adopt the old or the new system at his discretion, and if the metrical system should be found more convenient, it would gradually displace and supersede the others."

Mr. Savory had listened attentively to the statement which had been made with reference to the subject they had met to consider. He had also read the propositions which had appeared in the *Pharmaceutical Journal*, and he must say, as the result of his experience, that he believed the introduction of a new system of weights for dispensing purposes, as proposed by Dr. Wilson, would be fraught with danger. In the present day, things were done at railroad pace, and prescriptions were expected to be dispensed in the shortest possible time. Under such circumstances, dispensers would be constantly liable to make mistakes between the old and new systems of weights. Then, the public often made up their own medicines, and in doing so, would have to learn the new system of weights. He could see no benefit that was likely to result from the proposed change, but, on the contrary, much inconvenience, inaccuracy, and even danger. He was therefore an advocate for continuing the use of the present troy weights in the preparation of medicines, but he saw no objection to the introduction in the Pharmacopœia of a separate column, as proposed by Mr. Squire, for expressing the equivalent weights according to the metrical system.

Mr. Stewart (of the house of Dinneford and Co.), as representing one of the old houses, protested against any change in the grain. If Dr. Wilson's proposition were adopted, he said, it would be found necessary not only to keep two sets of weights, but to have two departments in the shop—one for old prescriptions, and the other for new. He was averse to change, and disposed to favour the proposition which had been made by Mr. Squire.

Dr. Redwood said it appeared to be overlooked by those who had spoken, that some change must be made, as the weights used in Ireland were at present different from those used in England and Scotland, and the Medical Council were required to fix upon the true system to be adopted alike by all.

Mr. Waugh observed that, admitting that to be the case, two out of the three Colleges were at present united in using the troy weight.

Mr. Deane said it must be borne in mind that a great difference existed between the dispensers of medicine in England and Scotland, and those of Ireland. In the latter country those who dispensed medicines were compelled to pass an examination in medicine. Not even an assistant could be employed who had not passed this ordeal. They were therefore more generally qualified than the corresponding class in this country, and changes such as had already been made there, were not so likely to lead to error, as would be the case here. Viewing the question as affecting all those engaged in the dispensing of medicine in this country, he thought any change would be attended with inconvenience, and would be likely to lead to some inaccuracy. If a change were thought to be necessary, it should at once be made to a system that would be likely to prove permanently satisfactory. There seemed to be a general impression that the metrical system was the best, and that ultimately it would be adopted in this as well as other countries. The question really was, therefore, whether it was desirable to have one change or two. He was disposed to think it would be better to retain the present weights until a change could be made to that which would be permanently adopted. With the prospect of the French metrical weights being ultimately used, Mr. Squire's plan appeared to be a good one, of having in each formula in the Pharmacopœia a distinct column for the French weights. This plan had been adopted in the French Codex, where it was found to answer the purpose extremely

well of preparing the way for the adoption of the gramme, and, moreover, had the advantage of representing the ingredients in parts.

Mr. Pedler perfectly agreed with what had been said by Mr. Deane and other speakers. The troy ounce had been used in France before the introduction of the metrical system, and it was still used in many continental countries and in America. He was sorry to find that the Scotch had so readily acceded to Dr. Wilson's proposition. If a change was necessary, let it be at once to the metrical system. He considered Mr. Squire's suggestion deserving of their unanimous approbation. The Chemists were generally a well-educated class, and would be expected to take the lead in promoting the adoption of a comprehensive measure for changing the system of weights and measures used in commerce throughout the country.

Dr. Edwards felt disposed to agree with Mr. Squire, but at the same time he thought it would be much the best plan, in the formulæ in the Pharmacopœia, to express the quantities in parts. He was an advocate for the metrical system; yet the proposals which had been made for modifying our present system should receive a careful consideration. He did not approve of the plan adopted by the Dublin College, being of opinion that new values ought not to be given to old denominations of weights. Dr. Wilson had gone further, even, than the Dublin College in this direction, by changing the value of the grain. He objected to Mr. Griffin's and Mr. Warington's plans, on the ground that the unit of seven grains was an inconvenient and imperfect one, and he should prefer the expression of even large quantities in decimal grains rather than adopt a decimal division of an unit of 7. The question affected the dispenser very differently from the compounder of preparations. Considerable inconvenience must arise to the former from any change in the smaller weights, especially if new values are attached to old signs and denominations. For the formulæ of the Pharmacopœia, a simple decimal system could be adopted without confusion, whatever be the unit taken. It would, therefore, be desirable to anticipate the adoption of the metrical system, which is generally acknowledged to be the most scientific and perfect, and which is understood in most countries of Europe, and is gradually making its way into the commerce of this country. For immediate convenience, no doubt Dr. Wilson's plan presented some advantages to the compounder, but whatever change was now made, he considered it desirable to adopt Mr. Squire's suggestion of giving the equivalent weights of the metrical system, as ultimately these will, no doubt, become universal.

Dr. Redwood, although he did not wish to oppose what appeared to be the prevailing opinion of the meeting, yet could not agree with much that had been said, and he thought especially that full justice had not been done to Dr. Wilson's proposition. The subject was one to which he had devoted some attention, and there were three important considerations connected with it to which he wished to refer. The first was the existence of a present evil. In considering what weights and measures should be adopted in the British Pharmacopœia, the question naturally arose as to whether any objection attached to the systems now in use. It had long been felt to be an evil that in all dispensing establishments there were two systems of weights used, in which the same names were applied to weights of different values. The avoirdupois weight was that alone by which drugs as well as other merchandise were sold; but as this system did not comprise sub-divisions sufficiently low to admit of its application for weighing small doses of medicine, another system, founded on the troy grain, was directed to be used both for dispensing prescriptions and also for preparing the medicines ordered in the Pharmacopœia. This use of two systems of weights by the same individuals, especially as the same names were given to weights of different values, led to much confusion, and not unfrequently, he believed, to inaccuracy. He thought this, which was an evil now existing, had not been sufficiently referred to, or acknowledged, by previous speakers, who had spoken

of inaccuracies which they thought would arise from the introduction of a new system, such as Dr. Wilson's, but who seemed to forget that there was a fruitful source of confusion and inaccuracy in the existing arrangement. A very large proportion of the Chemists and Druggists throughout the country did not keep apothecaries' weights of sufficient magnitude to enable them to make up the preparations of the Pharmacopœia with such, and they were, therefore, obliged to translate the apothecaries' into avoirdupois weight, which of itself often led to error, or, what was worse, they sometimes substituted the avoirdupois ounce or pound for the apothecaries' weights of those denominations. The inaccuracy arising from this source was, he believed, far greater than any that was likely to arise from the adoption of the new grain suggested by Dr. Wilson. The system which had been proposed by Dr. Wilson would afford a remedy for the evil to which he had referred, by making the avoirdupois weight, which all commercial men knew and used, available for prescribing and preparing medicines.

But then there was another consideration, which was that a change from the present to a new system, in which the value of the grain, scruple, and drachm, now used in prescribing, would be altered in value, could not fail to cause much trouble and inconvenience to dispensers, who would have to use the old weights for old prescriptions, and new weights for new prescriptions. This was the view of the subject which had been principally dwelt upon by those who had preceded him. He was not at all disposed to undervalue this consideration, and had felt so strongly the importance of not throwing difficulties in the way of dispensers, that his feeling had been in favour of leaving things as they were.

There was, however, yet another consideration, which related to the introduction of the French metrical system at some future period. This was a prospective advantage, which Mr. Squire hoped to attain by continuing the use of the troy grain, and giving the equivalents of the troy weights in a separate column expressed in grammes. It was urged as an argument in favour of the continued use of the troy weight, that it admitted of more easy comparison with the metrical weights than did the avoirdupois weight. But it must not be forgotten that, should the metrical weights be adopted in this country, it would be for general commercial purposes, and, as the avoirdupois weight was alone used for these purposes at present, it was more important to teach the relation of the metrical weights to the avoirdupois than to troy weight.

Mr. Waugh was not prepared to discuss this subject as a scientific question, but he thought, as practical men, they were called upon to express an opinion with reference to the proposition which had been made to change the value of the weights used in dispensing medicines. He thought such a change very undesirable; in fact, he could not admit that a case had been made out in favour of any change. Some of the plans, like others which had been recently proposed, looked very well on paper, but when submitted to practical men they were found to be impracticable. He had been sorry to hear Mr. Redwood express an opinion that errors often arose from the substitution of avoirdupois for apothecaries' weight in making the preparations of the Pharmacopœia.

Mr. Wiggin, of Ipswich, had also felt that an imputation had been unjustly cast upon Chemists by assuming that they either did not keep troy weights, or were not able to calculate the equivalent in avoirdupois weight for the apothecaries' weight ordered in the Pharmacopœia. For his own part, he could say that he would be ashamed of any apprentice in his establishment who, after six months' apprenticeship, did not know the value either of the French gramme in troy grains, or of the apothecaries' weights in avoirdupois weight.

Mr. Haselden said, if it was necessary to have any change, by all means let it be at once a change to the best system that could be adopted, and the metrical system was acknowledged by all to be the simplest and best; but should that system be adopted, he thought it would be the medical profession who would experience the greatest inconvenience. In introducing a new system of

weights, he would suggest that it should first be applied to general commerce, and to Pharmacy last, so that people may become acquainted with it before it was used in preparing medicines.

Mr. Cracknell was quite prepared to bear out what had been stated by Mr. Redwood with reference to the small proportion of Chemists who used troy weight in making the preparations of the Pharmacopœia. Some years ago he made special inquiry into this subject, and was surprised to find how few used the troy weights.

Mr. Deane could also confirm what had been stated by Mr. Redwood. He considered that the use of weights in the Pharmacopœia, which differed from those commonly used for all commercial transactions, was an evil for which it was desirable to find a remedy. The young men they took as apprentices were acquainted with the avoirdupois weights, with which they were accustomed from their childhood to make purchases, and he knew from experience, that when placed behind a Chemist's counter, they were very liable to confound the two systems of weights they were required to use. He believed this was a frequent source of inaccuracy in the preparation of medicines. This view of the subject had not occurred to him when he previously spoke.

Mr. Hooper strongly objected to making the obtuse intellects of dull apprentices the standard to which the regulations relating to this subject were to be brought down. He thought the troy weight better than the avoirdupois, and was surprised to hear it stated that inaccuracies arose from the substitution of one for the other.

Mr. Griffin said as his name had been mentioned, and a proposition he had made some years ago referred to, he was anxious to make a few remarks, especially as it seemed to be considered that troy weights were more easily compared with the metrical weights than the avoirdupois. He did not think this was the case, and in the proposition he had made, and which was published in the *Pharmaceutical Journal*, he had shown how the avoirdupois weight could be made a decimal system, which was easily comparable with the metrical system.

Mr. Bailey, of the house of Godfrey and Cooke, spoke in favour of the retention of the present apothecaries' weight, and thought the change proposed by Dr. Wilson would cause much inconvenience.

Mr. Marks thought there were obvious advantages in a decimal system of weights, and that very little modification of the existing system would render it completely decimal. The apothecaries' and troy weights being identical in the grain and pound, he thought it very desirable to retain the grain unaltered. The grain, ten grain (℈ss.), and twenty grain (℈j.), were already in use—thus far strictly decimal. Why not extend this system, and have fifty, hundred, thousand, ten thousand, and hundred thousand grain weights? The present drachm, ounce, and pound might be retained for the present, and they might be named from their respective numbers of grains, or called by their present names, as might be thought best. In time, no doubt, they would fall into disuse. Our system would thus be very nearly assimilated to the French system, in which they have their gramme, and fifty, hundred, five hundred, thousand, &c., grammes. We might in like manner have our scruple, and fifty, hundred, five hundred, thousand, &c., scruples. In the denominations less than a gramme the French have *deci-*, *centi-*, and *milli-*grammes; we might have tenths, hundredths, and thousandths of a scruple. The thousand scruple weight might have a definite name, just as the thousand gramme has in the metrical system. He threw out this suggestion in a somewhat crude form, but thought it might be made the basis of a system deserving of consideration.

After some further discussion, it was moved by Mr. Savory, seconded by Mr. Mason, and resolved,

"That the opinion of the Pharmaceutical Society, expressed at this public

meeting, is strongly opposed to any change in the weights now used in medicine, and especially if such change should alter the value of the grain; at the same time they deem it would be desirable to place side by side the equivalents of the English and metrical weights, as suggested by Mr. Squire."

The foregoing resolution having been communicated to a committee of the Medical Council, Dr. Charles Wilson expressed a wish to discuss the subject with the gentlemen who had taken part in the proceedings at the meeting held on Wednesday, the 4th of May, and accordingly those gentlemen were requested to meet Dr. Wilson at 17, Bloomsbury Square, on Saturday, the 7th of May. At this meeting Mr. Squire occupied the chair, and the following resolution was passed:—

"That after a lengthened and lucid explanation by Dr. Wilson of the proposed change to the avoirdupois system, which succeeds in equalizing the weights and measures, but alters the value of the grain, this meeting is not convinced of the desirability of such change, and must adhere to the opinion unanimously passed at the last meeting specially convened for the consideration of the question."

[We understand that at a conference of the three Pharmacopœia Sub-Committees of the Medical Council, for England, Scotland, and Ireland, recently held, the prevailing opinion was favourable to Dr. Wilson's proposition.]

CONVERSAZIONE.

The Annual Conversazione, at which the President, Vice-President, and Council are accustomed to receive the Members and Associates of the Society, and their medical and scientific friends, was held, for the present year, on Tuesday evening, the 17th of May. The new room which has been added to the Museum, and which is intended for the reception of chemical specimens, was open to the visitors, and this and the other reception-rooms were densely crowded throughout the evening. The Council were, as usual, indebted to many friends of the Institution for objects of interest, which, together with the specimens contained in the Society's Museum, formed interesting topics of conversation.

One of the rooms was set apart for the exhibition of objects by the microscope. A large number of first-rate instruments were provided, by means of which minute animal and vegetable organisms, and some crystalline bodies, were exhibited, some of which were shown by polarized light. Microscopes were supplied by the President, Mr. Hills, Dr. Dempsey, Mr. Squire, Mr. Deane, Messrs. Smith and Beck, Messrs. Horne, Thornthwaite, and Co., Mr. Bennett, Professors Bentley and Redwood, &c., &c. Among the objects shown were a large collection of starches.

Mr. J. Bohn, of Essex Street, Strand, and Mr. R. Kennedy, of Covent Garden, supplied vivaria, well stocked with a large number of marine and fresh water animals and plants.

Messrs. Smith and Beck, in addition to microscopes and stereoscopes, exhibited some very beautiful stereoscopic views of the moon, as taken by Dr. De la Rue.

Mr. Yates, of Lauderdale House, Highgate, supplied a very complete set of illustrations of the metrical system of weights and measures, with the view of showing the advantages of this system over the systems in use in this country.

Mr. Squire also supplied some illustrations of the metrical weights and measures as compared with troy weight.

Mr. Oertling exhibited one of his best balances for chemical analysis, and a complete set of decimal weights.

Professor Tennant, Mr. G. Knight, of Foster Lane, and Mr. Brewer, of Liverpool Street, supplied a large number of minerals and crystals.

Mr. Pratt, of 420, Oxford Street, some instruments employed in surgical operations.

Messrs. Godfrey and Cooke, a medicinal inhaler.

Messrs. Murray and Heath, an electro-magnetic motive engine; a carriage propelled by electro-magnetism, and some stereoscopes.

Mr. E. J. Manwaring, 1, Trafalgar Road, Old Kent Road, a patent panoramic stereoscope. This consists of an ordinary stereoscope, to the end of which a small box is fitted, which, by a simple mechanical arrangement, enables the observer to bring a succession of stereoscopic pictures into the field of view by turning a handle.

Mr. J. A. Coffey exhibited a very complete working model of the Coffey's spirit still, now generally employed by distillers for distilling spirit of wine; also the counter stove, for boiling by a gas-lamp.

Mr. P. L. Simmonds and Professor Bentley supplied a large collection of vegetable productions, including fruits, seeds, &c., many of which admit of useful applications.

Messrs. Versmann and Oppenheim exhibited some muslins and other fabrics, prepared by their patented process, by which they were rendered non-inflammable.

Mr. Morson supplied specimens of Persian opium, guarana, Monesia bark, copal, and the seed vessels of the grapple plant; also models of fruit in porcelain.

Mr. D. Hanbury supplied specimens of Austrian rhubarb and true Venice soap.

Dr. William Squire supplied specimens of piperine, coumerine, helenine, cinnamylic acid, propylamine, and dugong oil.

Mr. Sandford supplied a magneto-electric machine, some photographs, and a Chinese balance.

Messrs. J. and M. Vokins, of Great Portland Street, supplied two pictures—the Deserted Village, by Topham, and a marine drawing, by Duncan.

Mr. Phillips, of Oxford Street, supplied some handsome flower-tands and other works of art.

Mr. Harvey, of Rathbone Place, a patent portfolio and stand, with prints in calotype.

Mr. Walker, Margaret Street, some specimens of photography.

Mr. A. Dunn, marking ink pencils.

Mr. Condy exhibited the effects of his patent fluid, or natural disinfectant, which, according to Professor Schönbein, contains oxygen in the state of ozone.

Mr. Peover, a chromeidoscope.

Mr. Bestall, 82, Brook Street, Kennington Road, a simple and inexpensive apparatus for exhibiting the effects of polarized light.

Dr. Scott Alison, a double stethoscope, called the *differential stethophone*. By means of this instrument it has been found that a major impression made on one ear will prevent all consciousness or perception of a minor impression made at the same time on the other ear, by the same sound; and that an impression on one ear which produces a distinct sensation may be made to produce no sensation whatever, by conveying at the same time a major impression of the same sound to the other ear; the sensation obtained through the latter ear totally destroying or obliterating all sensation of the same sound in the other ear. A full description of this instrument will be given in a subsequent number of this Journal.

Mr. W. Crookes exhibited the photographic impressions he obtained by the sole action of heat, in the course of his experiments on the alleged new action of light, and which were noticed in our last number, page 575.

Mr. Gillard exhibited the Water Gas, which attracted considerable attention, and an account of which will be found at page 628.

Professor Hughes's Printing Telegraph also formed a very attractive object throughout the evening.

Among other objects exhibited were several photographic and philosophical instruments, from Messrs. Horne, Thornthwaite, and Co.; Whitehouse's Quan-

tity Battery, containing large gas carbon plates; and Dr. Medlock's water filter, from Mr. Burton, of Oxford Street.

There was also exhibited in one of the rooms, the original drawing, made in 1841, by H. P. Briggs, R.A., of the Diploma of the Pharmaceutical Society, and lately presented to the Society by the President.

EIGHTEENTH ANNIVERSARY OF THE PHARMACEUTICAL SOCIETY.

May 18th, 1859.

MR. JACOB BELL, PRESIDENT, IN THE CHAIR.

Mr. Morson stated that the President was suffering from an affection of the chest, attended with loss of voice, and had therefore requested him to read his Address to the Members, as follows:—

ADDRESS OF THE PRESIDENT.

The Report of the Council, presented to the Members at the Annual Meeting, relates chiefly to the proceedings of the past year. On the present occasion, being the eighteenth anniversary of the Society, I will, with your permission, preface that report with a digression, for the purpose of taking a bird's eye view of what the Society has done since its establishment, and glancing at what remains to be accomplished. The state of my health obliges me to reduce to writing the few remarks I have to make, instead of addressing you from the chair in the usual way, and, feeling that I have no prospect of being able to continue to take the active part in the affairs of the Society which I have hitherto done, the present time appears to be an appropriate opportunity to offer a few comments and suggestions, founded on the experience of more than twenty years, from the time of the preliminary proceedings which led to our union as a corporate body.

The most satisfactory circumstance connected with the Society, is the complete revolution which it has brought about in the feelings of the Members towards each other. The cold, shy reserve, almost amounting to suspicion, which previously existed, has given place to a spirit of unity, a cordial fraternity, and the consciousness that we have interests in common, that we have a duty to perform by the assistance of each other, and that these interests, and that duty, relate to the elevation of the character and status of our body by means of education. An association having such objects, and devoted to a branch of professional qualification, of vital importance to the public health, stands on very different ground from that of a "Trade Union" formed for the protection of the commercial and pecuniary interests of its members, or a "Benefit Club," which is a kind of self-supporting charity. Yet the Society, though taking a wider range, and aiming at a great public advantage, reflects also on its members an indirect benefit, which is the natural result of improved qualification and character.

The first steps towards this improvement were attended with much difficulty. Several attempts had been made by medical men and others to introduce an examination of Chemists and Druggists, compulsory on future members of the trade, before the Chemists took any interest in the subject. But the obstacles were found to be insuperable—first, because the Chemists and Druggists had no organization among themselves, by means of which the project could be carried into effect; secondly, because they were resolved and determined in resisting any interference, and especially the endeavour to place them under the jurisdiction of the Apothecaries. This, in fact, was the only subject on which any union whatever existed among them.

There was obviously only one course by which this complication of obstacles

could be overcome, and by which the Chemists could be extricated from their degrading position as an uneducated body, classified with hucksters, chandlers, &c. This course consisted in the formation of an association to represent the Pharmaceutical body; and if all the respectable and *bonâ fide* Chemists and Druggists of that date had joined the Society, the task would have been easily accomplished. With a proper organization and a few years of experience, such a body would have been in a position to dictate the terms of an Act of Parliament for regulating the education of Pharmaceutical Chemists, with scarcely a chance of opposition. This, however, was more than we had any right to expect; and the most experienced members of the trade maintained that it would be impossible to form an association of Chemists and Druggists under any circumstances. A few days occupied in personal communication with Chemists in different parts of London tended at first rather to confirm this impression. During the excitement about Mr. Hawes's Bill, considerable enthusiasm prevailed, but as soon as this was disposed of, and the question under discussion was the formation of a permanent society, the thermometer cooled considerably. The first difficulty to be overcome was the proverbial absence of sympathy or tendency towards any kind of union or social communication among the parties concerned, nothing but sense of danger from some threatened interference having ever previously brought them together. A few social meetings on a small scale, Pharmaceutical tea parties, and Pharmaceutical meetings, to which medical men also were invited, had the effect of partially breaking the ice, and the first number of the Pharmaceutical Transactions, containing an outline of the proposed plan and constitution of the Society, as well as other pamphlets and addresses of the committee, were extensively circulated among the Chemists and Druggists in London and the principal towns in the country. But it was necessary also to communicate personally with the members of the trade, many of whom never attended meetings, others seldom read pamphlets, and very few had ever bestowed a thought on the subject, or felt the want of scientific improvement. Still less could they understand what connexion could possibly exist between their personal interests, as Chemists and Druggists, and a Pharmaceutical Society, with School of Pharmacy, Board of Examiners, and other arrangements for instructing the rising generation.

On looking back at these early proceedings, some encouragement as well as instruction may be derived from a reference to the correspondence and personal communications, the great variety of sentiment elicited, and the ultimate settlement of all differences in the establishment of the Society. On the first introduction of a public measure, requiring individual co-operation and support, the same ground must be gone over, and the same phases of human nature—peculiarities of temper and disposition—present themselves. Those who take an active part in such undertakings, must be prepared for much labour, with many rebuffs and obstacles. It is here that a few suggestions, founded on experience, may probably be useful, as the success of the result depends mainly on the spirit in which it is commenced and carried on; and the same principles apply equally to the formation of a large institution, a branch society, or local establishment, and also to their maintenance in an active and healthy state afterwards. Although the Pharmaceutical Society at the outset had one very serious difficulty to contend with—namely, the entire absence of fraternity and disposition to pull together, which was the proverbial characteristic of the Chemists and Druggists—on the other hand it possessed a more than counterbalancing advantage in the soundness of its principles and constitution, and the obvious importance of the objects contemplated, which were fully admitted and appreciated by all those who took the trouble to investigate the facts and consider the arguments. The chief difficulty consisted in inducing the parties concerned to give their attention to the subject. Being men of retired habits,

generally at home, and seldom interfering with public business, something like a house to house visitation was necessary to bring the merits of the question fully and fairly before each and all of those whose co-operation was desired.

Starting on the hypothesis that the Society must sooner or later maintain its ground, the following rules of action were found essential in the preliminary labour of breaking the ice :—1. Never to take offence at any reception, however cool, abrupt, or even rude. 2. Not to be discouraged at a cold shoulder. 3. Not to look down on a man because he has a small shop or lives in a back street. 4. Never lose sight of the main object, from a mistaken notion of dignity and self-respect. 5. Never be goaded into a quarrel or loss of temper. Experience fully demonstrated the efficacy of this line of policy. A considerable number of Chemists having attended some of the meetings, or read the prospectus and reports, at once saw the importance of the movement, and identified themselves with it. Others required a little time to consider, or some explanation to clear up doubts. Some objected to the introduction of scientific education, considering it unnecessary and a hindrance to business. Others made it a rule never to interfere with public or parochial business of any kind. Others, again, objected on personal grounds—they saw on the list the names of parties with whom they would not associate. On the question of keeping the Society sufficiently select, without being too exclusive, great difference of opinion existed; but it became the general conclusion that the race of Chemists and Druggists of that date must be taken as they were, thus establishing the Society on a broad basis, and looking forward to the improvement of the rising generation.

The terms of subscription were a fertile source of difference, and many objected to subscribe on speculation, it being a matter of uncertainty whether the Society would be successful, or whether it would fall to pieces in a year or two, like previous associations. They were told that the success must of course depend on the number of members, and that if none would run any risk nothing could be done. It was a very general remark, that a certificate should be given to each member, which might be framed and glazed, as a means of distinguishing the promoters of the improved system of education from those who were careless and indifferent on the subject. The suggestion was entertained, and a plate, after a design by the late H. P. Briggs, R.A., was engraved and adopted as the Certificate of Membership. It is now used as the Diploma of the Society, the great seal being attached. Some declined to join, assigning no valid reason, but expressing surprise that they had not been earlier consulted: others unprepared for any such movement on the part of the Chemists and Druggists, treated the invitation to join as if it had been a begging letter, or an attempt to extort money. In some cases the subscription was distinctly stated as the objection to join in the "speculation;" in others, some other reason was given, while it was clear that the money question was the obstacle.

One of the most delicate matters to deal with at this early period was the alleged personal differences between members of the trade. It was a common remark, "Be careful not to ask A to meet B, they are not on good terms," or "C and D have not spoken to each other for years," &c. My answer in such cases was, "Then it is quite time to begin speaking to each other, and as for feuds and differences it is not our business to see them." Of course all were invited, they shook hands, and the clouds vanished. Another source of perplexity, and one which occupied much time, was the infinite variety of peculiar notions of those who, while in favour of the establishment of a Society, had their own views as to how it ought to have been done. Many of the suggestions offered were quite impracticable, others were handed to the Committee for consideration. With reference to this class of objectors, I was sometimes blamed by members of the Committee for "wasting my time" in "dancing attendance on men who were of no consequence." Here, again, I took the liberty of differing,

my theory being that every man is of consequence. One who can argue cleverly on the wrong side could argue better on the right, his ability would then be available FOR instead of AGAINST the Society; he may also have a circle of friends over whom he has influence. The correctness of this theory was entirely substantiated in practice, and some of the most active and enthusiastic members were among the number of those who were the most difficult, in the first instance, to bring into the fold. Another branch of the conciliatory policy to which I would invite attention, is the mode of dealing with opponents who find fault for no good purpose, but from a disposition to disturb harmony, and in a captious, quibbling spirit waste much time by a variety of charges or grievances which, on investigation, are found to amount to nothing. The proper mode of meeting such attacks consists in a concise statement of facts at the proper time, and an entire disregard of the hostility, even though it might be accompanied with abuse or insult. If a foreign Emperor desired to entangle England in a war, he would probably use some insulting language or invent a provocation for that express purpose, and some hot-headed statesmen might rave about the "national honour and dignity," and maintain that such an impertinent individual ought to be punished—and so he ought, but not by falling into his trap. His object is to pick a quarrel. The most severe punishment would be silent contempt at the insult, and dignified civility to himself. The same principle applies to great nations, to institutions, and to our individual transactions with each other. There must be two parties to a quarrel. If one of them pursues the even tenor of his way, regardless of threats or provocation, the storm subsides as a fire goes out when not supplied with oxygen. Harmony happily prevails in the Society at the present time, not a cloud is looming in the distance, yet a trifling misunderstanding or difficulty might at any time arise, and unless met in the right spirit, it might be magnified into serious importance. In 1851 the most profound peace reigned in Europe and almost all over the world. It appeared as if all nations were shaking hands at the Crystal Palace, and vowing eternal friendship. Some political movements in France, with other local events, magnified into general importance by the inflammatory effusions of a war-loving press, disturbed the prevailing harmony. The enormous increase of warlike forces, in which each nation vied with its neighbour on the principle of arithmetic, completed the mischief, and war was inevitable. A few years ago a riot was prevented at a contested election, by all the cudgels of one party being buried four feet under ground. Some of the committee were exasperated, and declined to share the responsibility, as it was understood that there would be a fight, and a large supply of cudgels had been provided on each side for the purpose of "keeping the peace." As soon as the other party heard that the cudgels of their opponents had been discarded, they followed the example, and a peaceable, orderly election was the result.

It would appear at first sight that these allusions are irrelevant, but they are illustrations of a principle applicable to many positions in life, and to none more so than the maintenance of harmony and good-fellowship in a large and widely-spread community. We have had since the establishment of the Society a few misunderstandings and disagreements, in the adjustment of which I took a prominent part. It is right that the members should understand the principle which was invariably acted upon in such cases, with good and satisfactory results, and as long as the business of the Society is conducted in the same spirit, there is no reason to apprehend any renewal of difficulties.

Some of these doctrines, commonly known as "peace principles," have been made to appear ridiculous by misrepresentation, and by describing imaginary coincidences of circumstances entirely inapplicable to the question at issue. A remedy, to be effectual, must be applied judiciously, and at the right time, other-

wise the principle has not had a fair trial. One fact is worth a dozen imaginary cases. Not many years ago it was confidently stated by the highest human authorities that "society could not be held together if duelling were abolished." This absurd fallacy has been entirely exploded, as well as many others of a similar nature, which have come within my own observation and experience, including the general belief in the absolute incompatibility of certain elements, now happily united into a large and flourishing Society.

On an extension of the domiciliary visits to the Chemists in Bath, Bristol, Exeter, Clifton, Plymouth, Devonport, Birmingham, Liverpool, Manchester, Newcastle, Leeds, Nottingham, Norwich, Dover, Brighton, and other places, the same peculiarities of disposition were observable, and the several classes of objectors, together with their objections, were so similar, that it was at each fresh place like going over the same ground again. In most instances some two or three or more responded at once, and made arrangements for meetings, calls, and correspondence, and among the others there were the usual routine objections, partial or total; the same ice to be broken in regard to peculiar views, retiring habits, aversion to any kind of public business, personal objections, or trade jealousies. To all these sources of argument and difficulty was added the controversy as to the comparative privileges enjoyed by London and Country Members. It seemed impossible to convince some objectors that it was not altogether a London Society, and a scheme for "taxing country Members" to defray the expense of lectures and meetings for those residing in London. The general advantages of association, increased influence, extension of knowledge, improved position, the Monthly Transactions of the Society, with the contingency of the Benevolent Fund, were reckoned in the scale as almost nothing compared with the privilege of attending a few lectures, the museum and the library in London, of which not one-tenth of the London Members availed themselves. Most of those who entertained these notions, have long ago seen reason to reverse their opinions, some of them having in their own families experienced the benefit of the education furnished by the Society, others having received timely relief from the Benevolent Fund, and all having seen undoubted evidence of the importance of a representative Council acting in London, watching over the interests of the entire body, and taking such steps as might be necessary in reference to any threatened Act of Parliament of an obnoxious nature. The objections on the part of country Members have almost entirely vanished, since they have been represented on the Council, and the Transactions have been transmitted by post. It should never be forgotten that the Society has much higher aims and objects than the minor considerations involved in these relative estimates of the advantages of London *versus* the Country; and the trifling subscription required for its maintenance sinks into insignificance by comparison with the improved status and character, increased public confidence, and favourable influence on business. A still higher motive is the satisfaction of raising the Pharmaceutical body from its former degraded state, to the rank of a profession representing superior qualification.

The arrangements and reciprocity subsisting between the North and South British Branches of the Society, although originally a source of some anxiety and delicacy, appear to be attended with entire success. It was in the first place uncertain whether our brethren on the other side of the Tweed would be disposed to unite in the establishment of the Society. When this question was settled, it was obvious that there must be an organization for Scotland, having its head-quarters in Edinburgh, and a committee or council, with other officers, were appointed accordingly. From frequent visits to Scotland with a view of assisting in these arrangements, and by simultaneous communication with the Council in London, I was enabled to surmount some apparent difficulties relating chiefly to matters of detail, so as to effect a result mutually satisfactory. For example, in re-

ference to the appointment of the Examiners for Scotland, who, by the Pharmacy Act, are required to be appointed by the Council, it became a question whether the appointment ought not to have been vested in the Members in Scotland. This, however, could not be done, as neither the Charter nor the Act recognize any distinct organization or constitution of the Society in Scotland. But the suggestion that the list of candidates as Examiners for Scotland should be proposed or nominated in Scotland and sent to the Council for confirmation and appointment as the Act directs, met the requirements of the case, and all parties were quite satisfied. The Council in London could have no object in originating a list, and having confidence in the Council in Edinburgh, the parties recommended are appointed as a matter of course. The constitution of the Society also in Scotland, although not specially defined by Act of Parliament, answers the purpose extremely well in practice. The meetings are held regularly, and lectures delivered. The examinations take place, and the reports are furnished to the Council in London, a balance sheet being sent annually showing the receipts and expenditure, and a sum of money is voted for the current year. On this subject I am desirous to impress on the minds of the Members that such grants of money form a part of the natural and legitimate expenses of the Society. It is not a contribution to some collateral institution. There is but one Society, The Pharmaceutical Society of Great Britain, and its character and objects must be sustained alike in Scotland and in England. The Act requires that a Board of Examiners shall sit in Scotland. They must have a place of meeting, with a Museum, Library, and other requisites for carrying on the proceedings. In all other respects also, the prosperity of the Society consists in the entire unity, harmony, and co-operation of its several parts or branches, and in the absence of any clashing of imaginary interests, whether arising from national jealousy or from some trifling misunderstanding which an appeal to common sense and a mutual explanation would at once clear up. The great interest I have taken in cementing this favourable union between North and South Britain, the agreeable visits I have paid with this object in Edinburgh, Glasgow, Aberdeen, and other places, the hospitality I have enjoyed, and the apparently complete success of the existing arrangements, induce me to hope that the Members of the Society will continue to act on the same policy and principles, and thus prevent the possibility of any trifling circumstance arising to disturb the existing harmony and fraternity.

The curriculum of education and the appliances of the School of Pharmacy might with advantage be revised and probably extended, if the Society possessed the powers to which it is justly entitled, and which the welfare of the public requires that it should possess under Act of Parliament. In that case, not only would the number of students at schools of Pharmacy and Chemistry be greatly augmented, but the education might be made more complete, and the character of the qualification represented by the diploma of the Society would rise in proportion. A rather serious responsibility rests on the Legislature for the obstacles which have been for many years thrown in the way of this improvement, in the face of the most complete evidence as to its great importance to the public safety, and the facility of carrying it into effect. A small amount of encouragement afforded to the Society instead of the most unaccountable rejection of all its appeals for further power or recognition, would have secured to the public the full benefit of the improved qualification which is so much required. The course of education has been from time to time extended, and the examinations made more complete. Yet we must not consider that the work is accomplished, or that our examinations are equal in stringency to those in some of the Pharmaceutical institutions on the Continent. The classical examination, especially, is defective, on comparison with the corresponding examination of the Dublin

Society of Apothecaries and some other institutions, but the standard is as high as can be maintained under the voluntary system, and the Government must be held responsible for any deficiencies which may exist. Lord Aberdeen and Sir James Graham saw the importance of the objects contemplated by the Society in 1843, and acted up to their conscientious belief by advising her Majesty to grant a Charter of Incorporation by way of encouragement, and with a view of promoting the success of the undertaking. Their successors in office have repeatedly expressed similar opinions as to the merits of the case, but have done nothing. The usual reply to appeals to the Home Office has been an admission of the great importance of the question, with a promise that the facts stated shall receive due attention, followed by an adjournment *sine die*.

In some respects, this treatment was calculated to discourage and dishearten those who had been labouring so many years for the good of the public, and who felt entitled to some acknowledgment of such services. But it is, on the other hand, satisfactory to find how much can be and has been effected, notwithstanding the apathy and iudifference of the Government. By perseverance the Society possesses the power of carrying out the desired object, sooner or later. No Bill relating to the subject could be carried without the aid of practical men. In the mean time, the work is progressing gradually, and so long as the Society continues to proceed with zeal and unanimity, it has the power to protect the public from the consequences of any foolish theoretical legislation of which we have lately seen some examples, and, sooner or later, we may reasonably hope that the Pharmaceutical body will be placed in its proper position in the profession, although some of us may probably not live to see the complete realization of our hopes.

Mr. Bird having had the honour of filling the office of Vice-President for three years, thought it right to make a few remarks, although, after the Address which had just been read, it might scarcely seem necessary. He congratulated the Members on the gratifying position of the Society, in the service of which he had always felt a pleasure in using his best endeavours in the fulfilment of the duties of his office. He attributed the thriving state of the Society in a great degree to the exertions and energy of the President, who had taken a prominent part in originating, rearing, and upholding the Society. It was only his colleagues who could fully estimate the difficulties he had surmounted, and the perseverance required for this purpose. He (Mr. Bird), having been a Member of the Council eleven years, could form some idea of the amount of exertion requisite for the establishment and maintenance of such an institution, in which he could bear his testimony to the valuable services of the President, not only at the annual meetings, but on all other occasions where the interest of the Society was at stake. He hoped he would long continue in his present position, and that the Society would in each succeeding year gain additional strength and importance.

The Secretary (Mr. Bremridge) then read the Annual Report of the Council, as follows:—

REPORT OF THE COUNCIL.

FINANCIAL STATEMENT—*From 1st January, to 31st December*, 1858.

RECEIPTS.	£	s.	d.
Balance in Treasurer's Hands	162	13	3
Life Members' Fund:			
22 Life Members' Fees 147 0 0			
Interest 38 15 8			
	185	15	8
Benevolent Fund:			
Subscriptions 54 13 0			
Interest 147 6 7			
	201	19	7
Government Securities, Interest ...	165	1	1
Rent.....	202	12	6
Fees:			
25 Pharmaceutical Chemists 141 15 0			
42 Assistants 170 2 0			
73 Apprentices..... 153 6 0			
	465	3	0
Subscriptions:			
377 London Members ... 395 17 0			
1685 Country Members...1769 5 0			
194 Associates 101 17 0			
121 Apprentices..... 63 10 6			
	2330	9	6
Arrears of Subscriptions	81	18	0
Lecture Fees.....	12	12	0
Sale of Journals	4	4	0
Insurance	20	0	0
Balance of Petty Cash due to Secretary	5	15	10
	£3838	4	5

EXPENDITURE.	£	s.	d.
Benevolent Fund:			
Investment 95 18 7			
Gratuities 95 0 0			
	190	18	7
Conversazione 43 8 11½			
Pharmaceutical Meetings 14 11 2			
Repayments 17 8 6			
	75	8	7½
House Expenses	25	18	10½
Rent, Rates, Taxes and Insurance (including £50 to Secretary for Rent)	460	0	9
Alterations and Repairs	108	2	3
Fixtures and Fittings	35	19	4
Museum.....	69	15	5
Library	45	7	6½
Office Furniture	20	0	0
Stationery	15	18	10½
Printing and Engraving	91	16	0
Advertisements	1	1	0
Journals.....	712	2	11
Do. Postage and Delivery of	177	3	6
Postage	56	13	11½
Carriage.....	1	6	2
Collector's Commission.....	38	0	10
Travelling Expenses, Country Members	118	4	1
Salary, Secretary.....	200	0	0
Pension to late Secretary.....	150	0	0
Gratuity to Mrs. Morris	10	10	0
Wages.....	165	10	6
Expenses of Society in Scotland ...	53	2	10
Board of Examiners	76	13	0
Professor of Chemistry and Pharmacy, including duties as Curator in his department, and payment of Assistant	300	0	0
Professor of Materia Medica and Botany, including duties as Curator in his department, and payment of Assistant	250	0	0
Subscription to Royal Botanical Gardens	21	0	0
Prize Medals, &c.....	13	11	0
Law Costs, &c.....	57	8	0
Insurance, Dr. Redwood's claim ...	13	0	0
Repayment to Secretary, Petty Cash, due 31st Dec., 1857	8	0	10½
Balance in Treasurer's hands.....	275	9	6
	£3838	4	5

We, the undersigned Auditors, have examined the Accounts of the Pharmaceutical Society, and find them correct agreeably with the foregoing statement, and that, as shown by the Books of the Society, there was standing in the names of the Trustees of the Society, at the Bank of England, on the 31st day of December, 1858:

	£	s.	d.
On Account of the General Fund, New 3 per Cents.	5643	0	2
Benevolent Fund, 3 per Cent. Consols.....	5134	9	3
Life Members' Fund, 3 per Cent Consols	1325	18	7
And at that date there was due to the Life Members' Fund	281	8	0

JOHN CARR,
WILLIAM BOWER,
ARTHUR BOWDLER HILL,
JAMES B. BARNES,
ADOLPHUS FREDERICK HASELDEN,
} Auditors.

24th February, 1859.

The Council have the satisfaction of reporting that the general business of the Society has proceeded with rather more than the usual activity during the past year. The numerous inquiries as to the terms and conditions of admission indicate an increasing desire to become connected with an institution which has already acquired a prominent position as a collateral branch of the medical profession, and is exercising an important influence on the standard of Pharmaceutical qualification in this country. The growing impression that sooner or later—and, as many persons believe, at no distant period—the Society will represent, as it was always intended that it should, the entire body of dispensing Chemists in the kingdom, has produced a reaction in many quarters, where the efforts to bring about this result were formerly viewed with comparative indifference. This is further indicated by the occasional assumption of the title of Pharmaceutical Chemist, and the imitation of the emblems of the Society by persons having no connexion with it, of which several cases have been brought under the notice of the Council during the past year. These parties, on being informed that they were liable to penalties for the infringement of the Pharmacy Act, have in every instance discontinued the offence. There can be no doubt as to the fact that a law, requiring all future dispensers of medicine to be Pharmaceutical Chemists, would induce all students and apprentices to prepare themselves and come up for examination; nor is there less reason to believe that if it were possible once more to relax the regulations respecting examination in favour of Chemists in business prior to the present date, very few, if any, would fail to avail themselves of the opportunity. The Council are still looking forward to the passing of a law which, while preserving vested interests at the date of such Act, would make examination compulsory on all future dispensers of medicine. This is the grand object in which all Chemists, whether in or out of the Society, and also the public at large, are equally interested.

The School of Pharmacy has been well attended during the past session, and the progress of the students satisfactory. The number of students in the laboratory during the session, although somewhat less than last year, has been above the average of the last three or four years; and this is also the case with the attendance at the lectures.

This diminution, although numerically unimportant, is worthy of notice as a significant fact. Last year a general impression prevailed that an Act of Parliament was about to be passed, recognizing and encouraging education by making some distinction between those who are duly qualified, and unqualified persons. Such anticipation naturally induced young men about to enter the business to make inquiry and to consider what course it would be policy for them to pursue, and the result was an unusually numerous attendance at the School of Pharmacy in London, as well as other institutions where scientific instruction is obtainable, in town and country. During the present year, the tendency of the "Poison Bill" before the House of Commons was rather in the direction of merging distinctions founded on qualifications, and placing all classes, from Medical Practitioners downwards, under the same jurisdiction and regulations. This retrograde line of policy had the effect of throwing a wet blanket on the educational movement. So long as the Legislature persists in discouraging Pharmaceutical education, and throwing every obstacle in the way of improvement, the difficulties the Society has to contend with must of necessity be increased, and in the same proportion the credit will be greater when the desired object is attained, and the Dispensers of Medicine in this country have become an educated body in spite of the opposition of each successive Government during the last eighteen years.

The number of candidates who passed the examinations during the year 1858 are—73 Classical, 54 Minor, and 40 Major.

A considerable improvement has been made in the Museum during the past year, another spacious room having been added, and glass cases and other

fittings adapted for the exhibition of specimens, provided. This has enabled the Library and Museum Committee to make available parts of the collection which had previously been kept out of sight for want of space. Some curious and interesting specimens of Materia Medica, collected by Dr. Maton, and subsequently the property of the late Dr. Robert Brown, have been presented to the Society by Mr. Bennett, his executor.

The Committee appointed to assist in the preparation of the British Pharmacopœia have had frequent meetings during the past year, and the subject has also occupied the attention of several Pharmaceutical meetings, at which various propositions have been discussed and improvements suggested. The Pharmacopœia Committee of the General Medical Council entrusted by the Medical Act with the duty of compiling that work, having requested the Society to appoint a Member to attend on its behalf, Mr. Squire was chosen by the Council of the Society for that office. By this arrangement, frequent communications take place between the two Committees. Similar proceedings are also in progress in Edinburgh and Dublin, where Committees are actively engaged in the undertaking, and in regular communication with each other. The inconvenience arising from the incongruities between the three Pharmacopœias is, therefore, likely soon to terminate.

At the last Anniversary the Council reported the proceedings with reference to the Sale of Poisons Bill which had been introduced into the House of Lords. Communications had taken place with Members of that House; several Members of the Society had been examined before a Select Committee, and the original Bill had been withdrawn for the purpose of introducing amendments. An interview with the Home Secretary was appointed, but a change in the Ministry caused a temporary suspension of proceedings. The suggestions of the Committee were afterwards laid before Mr. Walpole, and again communications took place with members of the House of Lords. Such was the position of the question at the last Anniversary.

On the 11th of June, the provisions of the Bil introduced by the Earl of Derby (as amended by the House of Lords after the sitting of the Select Committee) were considered *seriatim* by the Committee. On the 14th, the President reported the result of several interviews with members of the Government, to whom the suggestions of the Committee had been referred.

While these negotiations were in progress arrangements were made for holding a special Meeting of the Members to consider the Bill. This Meeting took place on the 12th of July, and was numerously attended. It was the unanimous opinion of the Meeting that the Bill, although less obnoxious than the original one, was in many respects very objectionable, and, in fact, impracticable. Certain proposed amendments were discussed, and unanimously agreed to as being essential, and the Council were requested to watch narrowly the progress of the Bill, and to give immediate information to the Members in the event of opposition being necessary. The Earl of Derby being confined to his house by illness, authorized Lord Hardwicke and Lord Talbot de Malahide to communicate with the representatives of the Society on the subject, and these noble lords, as well as several other Members of the Upper House, having seen the force of the objections urged against the Bill, recommended the adoption of most of the amendments suggested by the Society; after which the Earl of Derby, having recovered sufficiently from his illness to resume his place in the House, took the Bill into his own hands, and passed it, *sub silentio*, without any amendments. The only course then left for the Society was that of opposing the Bill in the House of Commons. This was not decided upon without some regret, as the Bill with the amendments which had been agreed to by the noble lords entrusted by the Earl of Derby to conduct the negotiation, would have been on the whole a practically useful measure, notwithstanding some provisions to which the Committee objected, but which were submitted to

by way of compromise. Being driven to the necessity of an opposition, the Council informed the Members by circular as to the state of the case, and petitions from all quarters were presented to the House against the Bill. Numerous meetings of the Committee and communications with the Home Secretary having taken place, an appointment was made for a deputation to attend at the Home Office; this Mr. Walpole postponed until the 17th of July, and then declined to receive the deputation, informing the chairman that such interview would be useless, as the Bill had been withdrawn, it being impossible to introduce amendments or to pass the Bill in any form in the face of such an opposition.

The Council did not lose sight of the question, but in anticipation of a Poison Bill being introduced on the re-assembling of Parliament, it was thought advisable to be prepared with the draft of a Bill, which in case of need might be submitted to the consideration of the Home Secretary. The draft so framed was founded on the Bills recently abandoned, but with the omission of the most objectionable provisions, and the addition of several sections providing for the proper qualification of future vendors of poison and dispensers of medicine. On the 4th of Feb., of the present year, the day the House met after the recess, Mr. Walpole gave notice of a "Sale of Poisons Bill," to be introduced on the 6th. No time was lost in communicating with the Home Secretary, to whom the draft Bill prepared by the Council was submitted before the appearance of the Government Bill. Mr. Walpole expressed a disposition to receive with attention any suggestions that might be offered, and said he would defer the second reading for at least ten days, to allow time for such suggestions, but declined to engraft upon the "Sale of Poisons Bill" any provisions relating to qualification, which, however, he acknowledged to be so desirable, and in fact necessary, that he would be prepared to introduce a subsequent measure with that object. The present Bill, Mr. Walpole stated, related merely to the "*keeping* and *sale* of poisons." On the appearance of the Bill, the Committee met several times to consider it in detail, and prepared a few amendments, the introduction of which would, in their opinion, remove any just grounds for opposition, and pave the way for a more effectual measure having reference to qualification. Mr. Walpole entertained favourably most of the suggestions, and promised that all should have his serious consideration. The Bill was postponed several times, during which interval Mr. Walpole was succeeded in the office of Home Secretary by Mr. Estcourt, who, having the subject suddenly thrust upon him among other business, was imperfectly acquainted with its details, and unable, in the pressure of other duties, to give much attention to it. Accordingly, the Bill was committed *pro formâ* for the purpose of introducing amendments, and on its reappearance in its new form was found to be more objectionable than before. The Poison Bill Committee met several times to consider it, and a deputation having obtained an interview with Mr. Estcourt, explained the nature of the objections to the Bill. The result of the interview was not altogether satisfactory, as it was obviously a fresh subject with the Home Secretary, and required more attention than he had time to devote to it. The Committee again met, and after a further consideration of the subject, with the very small prospect of making the present Bill at all practicable or even tolerable, a resolution was passed to the effect that the Sale of Poisons Bill now before the House of Commons, containing no present or even prospective provision for qualification in the vendors of poisons, embodying very objectionable and absolutely impracticable clauses, and having been deprived of the small recognition of a distinction founded on qualification, the Committee recommended the Council to adopt immediate measures for opposing the Bill. A form of petition was prepared for signature by the Council, but before time had been allowed for any further proceedings, Mr. Estcourt prudently withdrew the Bill, and subsequent events in the House of Commons caused the question to be adjourned *sine die*.

It is the unanimous opinion of the Council that some acknowledgment is due to the Secretary, for the very efficient manner in which he discharges the duties of his office, for his constant vigilance in obtaining the earliest information respecting Bills before Parliament, and other matters affecting the Society, and for his very great activity and industry in attending to the business of the Society, without reference to the ordinary limitation of office hours.

In concluding this address, the Council would for a moment separate themselves from their President to express the deep sympathy they feel towards that gentleman on account of his continued indisposition; to return thus publicly their warmest thanks for the undiminished interest he has taken throughout the year in the affairs of the Society—an interest not confined to mere thinking and writing on its behalf, but always prompting him, regardless of personal convenience, comfort, and even health, to attendance at the Council Board, and wherever else his services could advance the interests of the Society.

Mr. Palk (of Exeter), in rising to move the reception of the Report, said that seven years had elapsed since he attended one of the annual meetings of the Society, and on the present occasion he had not looked forward to taking any part in the proceedings, but he most cheerfully responded to the invitation to move the first resolution—"That the Report of the Council be received and approved, and printed in the Transactions of the Society." He felt it to be an agreeable task to move a resolution which he was confident would receive the unanimous support of the meeting. No arguments or remarks were needed on his part to point out or elucidate the leading features of the Report, which was, in every respect, satisfactory. He had, from the commencement, as one of the founders and a life member, taken a deep interest in the Society; if all his brethren throughout the country had equally appreciated its advantages, the list of Members would have been very greatly extended. He was pleased with the remark that "the ice had been broken," and it struck him that the President having broken it, had continued to exert an influence which might be compared to the genial warmth of the sun dispelling the chill mists and the ice of winter, infusing new life and vigour into the landscape, and a general feeling of kindness and cordiality. Without such influence, the society could not have overcome so successfully the obstacles which, in the first instance, had attended it. There was only one suggestion which he desired to make—he had, on a former occasion, alluded to it—the fee from life members was originally twenty guineas, the annual subscription being two guineas; when the latter was reduced to a guinea, no allowance was made to those who had paid twenty. He thought the difference should be entered in the books as a donation to the Benevolent Fund, which would be a satisfactory and just compliment to the parties concerned. The President, in his address, had given a very distinct idea of the difficulties which beset the society during its preliminary proceedings, and the Report of the Council had clearly exemplified the efficiency of the arrangements, and the vigilance of those who had acted on behalf of the society in reference to the Poison Bill and other matters in which their interests were concerned. Formerly they could have had very little power to make themselves heard in such a case, and their general influence had also greatly increased since the complete establishment of the Society on principles of improved education. The society had become very generally recognized, not only by the profession, but by the public, and as time rolled on the rising generation would feel the benefit, and reflect the same on the public by their superior skill and intelligence in their business. In reference to the last paragraph of the Report, he felt certain that every member would respond to the sentiments of the Council in sincere regret at the serious indisposition of the President, and unite in prayers to the Almighty for his restoration to health, that he might continue his useful exertions on behalf of the Society as well as other institutions of a kindred character.

Mr. Pedler seconded the motion. He had been constant in his attendance at the annual meetings, and he did not recollect one at which so satisfactory a Report had been presented. It contained ample evidence of the care and fidelity with which the Council had watched over and advanced the interests of the Society. The

Chemists and Druggists in the country might feel assured that their claims and interests were not lost sight of by the Council in London, who, while representing primarily the Society, always aim at a general principle of justice towards the trade in its more extended sense. He concurred with the last speaker in his expressions of sympathy at the continued indisposition of the President, in which feeling he was sure the Members throughout the country would participate, as it was impossible to overrate the zeal and energy with which Mr. Bell had cheerfully devoted his time and abilities to the advancement of the Society. The position of the Chemist and Druggist had been greatly improved, and an admirable system of study established for the rising generation. The Museum of the Society could scarcely be surpassed, and the organization and present position were such as to command the respect of the public and the recognition of the Legislature. He had no doubt the Report would be unanimously adopted.

Mr. SLIPPER said, although personally unknown to the President, he could not refrain from expressing his feelings in favour of his conduct in the promotion and advancement of the profession; he had always admired the manner in which he had passed over remarks of a personal character; instead of noticing them, and thus probably causing a discussion calculated to injure the society, his chief desire appeared to be to promote harmony and union among the entire body of Chemists and Druggists. The Report was, in every respect, worthy of adoption.

Mr. W. F. SMITH alluded to the state of the Benevolent Fund. With more than 2,000 members, the annual subscriptions last year were only £54 13*s*.—about sixpence each. He thought by an appeal from the Council to the Members the amount might be increased, and they need not be afraid of having too large a fund, as there was ample scope for benevolence, and it would also serve as an attraction and a source of union among the Members. With regard to the protracted indisposition of the President, he felt so strongly that he could not express what he wished to say.

Mr. WAUGH concurred in Mr. Smith's suggestion about the Benevolent Fund, and thanked him for reminding the meeting of the subject, which he had no doubt would have a good effect. Nothing tended more to give permanent stability to a society than the possession of a large fund of this description. A shilling annually from each Member would add more than £100 a year. Fortunately the applicants at present were not numerous, but it would be well to be prepared.

Mr. PALK remarked that the list of subscribers to that fund contained only 77 names, of whom seven resided in Exeter.

Mr. BURDEN suggested that the last paragraph in the Report should be passed by the meeting as a separate resolution.

Mr. MORSON said the regular course would be to carry the Report as presented, it would then be identified with the proceedings of the meeting.

Mr. MACFARLAN was in favour of Mr. Burden's proposition. He could not overestimate the exertions of the President, who had been instrumental in obtaining for the Society the Charter and the Act, and had greatly assisted the Council in opposing the obnoxious Poison Bills. He (Mr. Macfarlan) fully concurred in every word contained in the President's address, especially that portion of it which related to Scotland. The Society must expect other obnoxious measures to be introduced into Parliament, and must be prepared to meet them with that spirit and judgment which had hitherto been found so successful. It was also desirable to be prepared with a judicious and reasonable Bill, such as they could recommend for adoption. He could not conclude without allusion to the great anxiety of the President, and his constant labour in promoting the objects of the Society. He had devoted not only his days and his nights to its service, but had sacrificed his health in the cause. If it would not be irregular, he should be glad to move that Mr. Bell be requested to sit for his portrait, to be preserved in the house of the Society, that, whenever it might please Providence to remove him, which he hoped might be many years hence, the Members might have before them the likeness of the originator of the Society.

Mr. BALLARD said he would be happy to second such a resolution when the one before the meeting was disposed of.

Mr. GEORGE EDWARDS (Dartford) remarked that they would never have obtained the Pharmacy Act if Mr. Bell had not gone into Parliament for the purpose of carrying it. The Government at that time, and for years previously, when applied

to by the Chemists and Druggists for an effectual Pharmacy Act, usually put them off by proposing to engraft Pharmacy on the forthcoming Medical Bill, which was extremely objectionable, and, at the same time, caused the repeated adjournment of the question to an indefinite period. Being, therefore, beset with difficulties, the case would have been hopeless without the aid of a representative in Parliament fully conversant with the subject. In the event of any other vexatious Bills being introduced, they must, as Mr. Macfarlan observed, be prepared to deal with them as with their predecessors.

The motion for the reception and approval of the Report was carried unanimously.

Mr. BURDEN moved, "That this meeting desires to unite with the Council in expressing their deep sympathy with their respected President, Mr. Jacob Bell, in his present serious indisposition, and recognizing gratefully his past invaluable services during the whole term of the existence of the Society."

Mr. GARLE seconded the resolution, which was also carried unanimously.

Mr. MORSON said he was requested by the President to express his regret that he was unable *vivâ voce* to acknowledge the sentiment so kindly indicated in the resolution. They must give him credit for the gratitude which he felt.

Mr. MACFARLAN reverted to a subject to which he had alluded in his previous remarks, and, after some further complimentary observations, moved that the President be requested to sit for his portrait for the Society. He hoped that Mr. Bell would consent, as it would be an agreeable memorial of his past services, and would be gratifying to those who had shared with him in the labour of establishing and keeping up the Society, and also to the rising generation, and their successors, who, while enjoying the result of such labour, might be interested in seeing the portrait of one who had taken so active a part in the formation and rearing of the Society, and whose example they might be advised to follow. He therefore moved, "That in testimony of the Society's appreciation of Mr. Bell's meritorious exertions in its behalf, Mr. Bell be requested to sit for his portrait."

Mr. WILSON (Sheffield) seconded the resolution.

Mr. BUTLER suggested that in the event of the portrait being painted, an engraving would also be acceptable to the members.

Mr. WAUGH fully concurred in the resolution respecting the portrait; not, however, under the feeling which seemed rather to guide the meeting. He hoped Mr. Bell would long be spared to preside over them, and for himself, he observed, that so long as he had the original before him, he should scarcely look at the portrait, which might be kept in reserve, he hoped, for many years to come.

The resolution was carried unanimously.

The PRESIDENT (through Mr. Morson) expressed his sincere acknowledgments for the kind sympathy expressed by the meeting, and also for the cordiality with which the last resolution had been carried. He could scarcely be expected on such short notice to give a definite answer to the question contained in that resolution, but he would always retain a lively sense of gratitude for the kindness of the Members on that as well as other occasions.

Mr. THOMAS HERRING moved a vote of thanks to the Council for their services during the past year. He had attended every anniversary since the establishment of the Society, but had never felt so much gratified at the proceedings as on the present occasion. It was a matter of great congratulation to find a body of men possessing talent, ability, and energy, associated harmoniously together, not merely for their individual benefit, but for the purpose of carrying out a great system of professional advancement, calculated to confer a corresponding benefit on the public. The Society had done wonders since its establishment, in raising the character of its Members, and especially of the young men who from year to year enter the business. Those who (like himself) were in constant communication with the Chemists and Druggists in all parts of the country, could not fail to observe a very marked improvement, which he attributed to the great advantages for study now offered to young men, and the increased attention of late years bestowed by the members of the trade generally on the quality of their medicines, and the discoveries continually coming forward in chemistry and science. He hoped the address of the President which they had heard that day, would be read and studied by all the Members, and that it would serve as an example to the rising generation and the Members generally. It had been suggested that a subscription of a shilling from each Mem-

ber to the Benevolent Fund would realize a large sum, but he thought a better plan would be to have a dinner. It was very well for water-drinkers to sneer at dinners, but he had generally observed that a glass of champagne is the best vehicle for benevolence. He expressed a cordial approval of the resolution for a portrait of the President, whom he would always be happy to support in his office, and hoped he would for years to come enjoy that satisfaction. He congratulated the Members on the improved status of the Society, and the favourable terms in which it was constantly spoken of by members of the medical profession.

Mr. Buckle seconded the resolution, which was carried unanimously.

Mr. George Edwards acknowledged the vote on the part of the Council.

After the usual vote of thanks to the Chairman, the Scrutineers having been duly appointed, and the votes of the Members present received, the meeting adjourned until Friday, the 20th instant.

ADJOURNED MEETING,

Friday, May 20.

MR. JACOB BELL, PRESIDENT, IN THE CHAIR.

The Scrutineers brought up their Report, as follows :—

We, the Scrutineers appointed at the Eighteenth Annual General Meeting of the Pharmaceutical Society, do hereby certify that we have duly examined the voting papers committed to us, and report the following results :—

Voting papers allowed	620
" disallowed for informality	30
	650

Bartlett	237	Collins	179	Hanbury	569	Meggeson	464
Bell	608	Cupiss	318	Haselden	297	Morson	541
Bird	476	Davenport	524	Herring	466	Sandford	388
Brady	288	Deane	535	Hollier	327	Wiggin	218
Brew	432	Edwards	437	Lescher	370	Williams	165
Carr	207	Fox	160	Mease	181		

(Signed) Edward Constance, *Chairman*
William Windle
Thomas Burden
Samuel Gale
John J. Fenn
George Galliers
Edwin Granger
Joseph Kettle
G. B. Francis
John H. Evans
B. M. Tippett
John Barnard

The following Members were therefore declared to constitute the Council for the ensuing year:—

COUNCIL.

Bell, Jacob, 338, Oxford Street
Bird, William Lionel, 41, Castle Street, Oxford Street
Bottle, Alexander, 57, Townwall, Dover
Brew, Thomas Archer, Brighton
Bucklee, William H., 86, New Bond Street
Cupiss, Francis, Diss
Davenport, John T., 33, Great Russell Street, Bloomsbury
Deane, Henry, Clapham
Edwards, George, Dartford
Edwards, John Baker, 50, Berry Street, Liverpool
Hanbury, Daniel Bell, Plough Court, Lombard Street
Herring, Thomas, 40, Aldersgate Street
Hollier, Elliott, Dudley
Lescher, Joseph Sidney, 60, Bartholomew Close
Macfarlan, John F., 17, North Bridge, Edinburgh
Meggeson, George, 61, Cannon Street
Morson, Thomas N. R., 38, Queen's Square
Sandford, George Webb, 47, Piccadilly
Squire, Peter, 277, Oxford Street
Standring, Thomas, 1, Piccadilly, Manchester
Waugh, George, 177, Regent Street

There being only the requisite number of candidates proposed for election as Auditors, they were declared to have been unanimously elected, as follows:—

AUDITORS.

BARNES, JAMES B., 1, Trevor Terrace, Knightsbridge
BOWER, WILLIAM, 96, Tottenham Court Road
DARBY, STEPHEN, 140, Leadenhall Street
HILL, ARTHUR BOWDLER, 11, Little Britain
PEACOCK, HAMERTON R., 170, High Street, Poplar

After the usual votes of thanks to the Scrutineers and to the Chairman, the meeting terminated.

PHARMACEUTICAL MEETING, EDINBURGH.

THE ANNUAL MEETING

Of the Pharmaceutical Society was held in 51, George Street, Edinburgh, on Friday evening, 6th May, at 8 o'clock,

MR. JAMES ROBERTSON IN THE CHAIR.

The SECRETARY, being called upon, read the following

ANNUAL REPORT.

THE Council have now, as in former years, to submit a report of the proceedings of the Society in Edinburgh.

The Scientific Meetings, extending over the Session which has so recently closed, have amounted to four in number, and while in frequency these form an average, parties who have been present at them can best testify as to the favourable comparison they will bear in point of interest and importance to any which have been previously held. Two were especially crowded, and the subjects introduced by the gentlemen who read papers on these occasions appeared to give all present much satisfaction. The Council will be glad to find in future years that Members do more than has yet been done to increase the number of these reunions during each winter session.

During the last year eight have joined the Society in Scotland by examination, while three have progressed a step in position, thus making eleven who have appeared before the Board of Examiners—a small number compared with what might have been, and leaving great room for increase. The Council, however, hope that as every day is adding to the status of the Society, parties will ere long be induced to join themselves to the Association. The Council would again take this opportunity to impress upon masters the necessity for rendering it imperative that all apprentices become pupils to the Society, because by such a proceeding the great and only objection urged against the Society here is considerably modified, viz. the one payment of £15 15*s*. As is now pretty well known, each apprentice on passing the classical examination pays a fee of £2 2*s*. only, and is not called upon to pay more until he undergoes the minor examination, which may not be for four or five years after he has connected himself with the Society. It would, however, be again urged here, what was strongly alluded to in the last annual report, that the Council in London should take into consideration whether it would not be advisable to spread the payment of a Member over a series of years, instead of making it, as at present, payable in one sum, immediately after the candidate has passed his examination.

The Library, as the printed catalogues which have been circulated will show, has been during the year considerably enlarged, and now contains some really valuable books. It may be stated that, in addition to the amount charged in the account about to be submitted, there has been a further sum of £10 spent, in order that the Library might be increased in value and usefulness. The amount thus expended on behalf of the Society has been obtained from a fund in the hands of the Secretary, irrespective of any allowance received from the Society in London. Contributions will be received by the Curators or the Secretary, so as to increase still further the popularity of this department. The Council regret that they cannot

yet arrange matters so as to admit Members and Associates in the country to receive volumes from the Library on loan, but when they can extend that privilege, due intimation will be given. The Council beg to thank Mr. Finlay Dun and Mr. Wardlaw Macfarlane for their donations to the Library.

The Museum is now in a prosperous condition. New cases having been fitted up, there is ample room for considerable additions, and as lists have been circulated showing the various specimens on hand, the Council hope ere long to find this department of the Society well worthy the name of a Museum belonging to the Pharmaceutical Society. The Council take this opportunity of thanking those gentlemen who have been the means of helping forward this good work, and would particularly notice the presentations by Messrs. Robertson and Co., who have contributed upwards of fifty valuable specimens ; also those from Messrs. Duncan, Flockhart, and Co., and from Mr. Mackay, to all of whom they think the Society much indebted for adding to the interest and importance of the museum.

The Council cannot congratulate the Society in too high terms upon the prospect of a National Pharmacopœia. This long and anxiously hoped-for event is now, they trust, about to be realized ; and as able committees have been, and still are, busy in the three capitals compiling what cannot but be viewed as a great boon, not only to Pharmaceutists in particular, but to the whole medical public generally, the Council do hope that the work now in progress may be, ere long, completed ; while, from the well-known fact that every new and improved system of manufacture in Pharmacy will be recognized, as well as from the introduction of many preparations already extensively employed, but not hitherto officinal, there can be little doubt a volume will be produced alike creditable to the compiler and useful to the profession.

The following is a statement of intromissions as from 1st Jan. to 31st Dec., 1858:—

Cr. *The Pharmaceutical Society in account with the Secretary.* *Dr.*

	£	s.	d.
Cash from London	50	0	0
Dec. 31.—Balance due Secretary	16	16	0
	£66	16	0

	£	s.	d.
Dec. 31.—Postages	2	5	2
" Advertising	1	1	1
" Delivering Billets	1	5	3
" Expenses at Meetings throughout Year	10	6	6
" Rent of Room	25	0	0
" Cases for Museum	11	9	9
" Insurance	0	7	6
" Books for Library	11	5	0
" Printer's Acct.	3	8	0
" Paper, Envelopes, &c.	0	7	9
	£66	16	0

December 31st, 1858.
Balance due Secretary at this date...£16 16 0

We, the undersigned, have examined the foregoing accounts with vouchers attached, find them correctly stated and entered, and the balance due to the Secretary at 31st Dec., 1858, sixteen pounds, sixteen shillings sterling.

JAS. ROBERTSON
JAMES GARDNER
WM. AINSLIE

Edinburgh 6th May, 1859.

Much annoyance has been from time to time caused by the vain attempts of Government to pass a Sale of Poisons Bill, and chiefly from the circumstance that the Lords and Commons tried to legislate and frame an Act of Parliament on a practical subject with regard to the real operation of which they were in total ignorance. This Society, always alive to the interests of Pharmaceutists, as well as from a desire to prevent inconvenience, discomfort, and even danger to the general public, watched narrowly every attempt made to introduce such unworkable bills, and have up to the present time been successful in preventing anything either obnoxious or absurd becoming the law of the land. The labour of the Society is not, however, at an end on this subject, and while bygone experience gives every confidence in the vigilance, talent, and ability displayed by the Council in London, to whom they think the warmest thanks of the Society here are due, they would not allow any exertion to

be spared in the endeavour to obtain from Parliament such a measure as would be hailed as practicable and useful, and which can only be based on compulsory education and increased fitness for the important duties of those who stand in the responsible position of Chemists and Druggists.

The Council cannot conclude this report without conveying thanks to the Curators of the Museum and Library, Messrs. Ainslie and Young. Their labours have, during the past year, been greater than usual, especially in reference to the preparation of the Museum and Library Catalogues, for the printing of which there required a good deal of labour and time.

Mr. Smith (St. Andrews) moved the approval of the Report. He thought that some change should be made in the conditions of entry to the Society, whereby one-half of the entry-money should be taken at first, and the remaining half by subsequent yearly instalments, and suggested that this subject should be brought under the attention of the Council in London. He rejoiced in the approach of the publication of the National Pharmacopœia, which he was sure would prove of great service both to town and country Members. In regard to the Sale of Poisons Bill, he thought Members of the Society in all parts of Scotland and England should use their endeavours to bring the views of the Society on the subject before members of Parliament. He was likewise of opinion that the present was a favourable opportunity for a counter-project being brought before Parliament in the shape of a measure to secure a compulsory examination of Druggists. It might be possible to combine such a measure with a Poisons Bill; and he thought that if the Members in England and Scotland would press the matter upon the different members of Parliament, there could be little doubt that the thing could be managed.

After a brief conversation, in the course of which a general concurrence was expressed in Mr. Smith's views regarding the desirability of pressing the opinion of the Society on the Poisons Bill before members of Parliament, the report was approved of, and a deputation appointed to wait upon the members of Parliament for Edinburgh and Leith with the above object.

Mr. Robertson then proposed Mr. Richard Raimes as President, and Mr. James R. Young Vice-President for the next year. This was seconded by Mr. Smith, and carried with acclamation.

Mr. Murdoch of Falkirk proposed the following gentlemen as Council:—The President and Vice-President, Messrs. Ainslie, G. Blanshard, Flockhart, Kemp of Portobello, Tait, Smith of St. Andrews, Gardner, Lindsay, J. F. Macfarlan, Hart of Glasgow, and Burrell of Montrose. Carried unanimously.

Mr. Ainslie recommended the following as Examiners:—President and Vice-President, Messrs. Flockhart, Gardner, Robertson, Tait, J. F. Macfarlan, Mackay, and the President and Vice-President in London, *ex officio*. Carried.

Mr. Raimes requested that Mr. Macfarlan should continue his valuable services as a Member of Council at the London Board, which was carried with acclamation.

Mr. Flockhart proposed that Messrs. Ainslie and Stephenson should be elected as Curators of the Museum and Library. Carried unanimously.

Mr. Macfarlan proposed that Mr. John Mackay be requested to continue to act as Secretary, and moved that a cordial vote of thanks be accorded to him for his past exertions in carrying on the business of the Society. Seconded by the Chairman, and carried with acclamation.

Mr. Macfarlan proposed a vote of thanks to the Chairman, who replied, and the meeting adjourned to the large hall.

Immediately after the transaction of the ordinary business, the Members of the Society and their friends, to the number of about sixty, sat down to an elegant supper. The chair was taken by Mr. Raimes, the duties of Croupier being efficiently discharged by Mr. J. R. Young. In proposing the toast of the evening, the Chairman expressed his sense of the important benefits which a Society like the present was calculated to confer on those who, like many of those around him, were engaged in the preparation and sale of medicines. He trusted that the operation of the Society would be effectual in preventing the occurrence of such a catastrophe as had recently occurred at Bradford, where so many people were poisoned by eating lozenges. He then congratulated the Members on the steady progress which the Society was making, and contrasted its present flourishing condition with that which it occupied a few years ago.

The following toasts were given and duly responded to:—"Honorary Members in Scotland," by the Croupier; "Mr. Gamgee and the Visitors," by the Chairman; "Apprentices and Assistants," by Mr. Robertson; "The Royal College of Physicians," by Mr. J. F. Macfarlan; "Unity of the Society," by Mr. Murdoch of Falkirk; "Brotherly kindness among Pharmaceutists," by Mr. D. R. Brown; "The retiring President," by the Croupier; "The Secretary," by Mr. G. Blanshard; "The Chairman," by Mr. Mackay; "The Croupier," by Mr. Blanshard.

Several songs were sung with much taste, and the evening was spent most agreeably, and, after joining in "Auld lang syne," the company separated at a late hour.

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

The Thirteenth Meeting of the Session was held in the Royal Institution, Colquit Street, April 28th, 1859;

MR. DUTTON IN THE CHAIR.

Mr. Abraham said that a new Pharmacopœia being in course of preparation, and suggestions invited, he would offer a few remarks on one point. It was desirable that the formulæ should be as *economical* as was consistent with efficiency. He referred particularly to the preparation of tinctures—a literal adherence to the Pharmacopœia directions for making them, involved in most cases considerable loss of material; and temptations were thus held out for variations which might or might not be judicious. In the preparation of tincture of aconite, of tincture of cinchona, and of ethereal tincture of ergot, according to the London Pharmacopœia, this was particularly the case, a large portion of the tincture remaining in the mass. In the Edinburgh Pharmacopœia this objection was partly obviated by the process of percolation, in which, by the use of an additional quantity of the menstruum, the whole of the tincture was recovered. But in some cases, particularly those in which proof spirit was used, the waste might be avoided if the Pharmacopœia permitted the drugs to be percolated with so much water as would restore the original measure of fluid. Where the strength of the spirit must be kept up, a stronger spirit might be used in, or added to, the first tincture. It would sometimes involve the necessity of filtration, but it would save the labour of expression.

Some further discussion took place in reference to the solubility of various substances in different menstrua, and some of the speakers expressed the opinion, that in using spirit varying in strength in successive portions in the process of percolation, the product in numerous instances would not prove so satisfactory, the substances held in solution in the first portion being partially deposited by the second or weaker spirit.

Mr. F. Jackson then read the paper of the evening,

ON METALLIC POISONS AND THEIR ANTIDOTES,

In which he suggested the administration of solution of hyposulphite of soda as the best antidote in all cases of metallic poisoning.

Royal Institution.

The Fourteenth Meeting of the Session was held May 12th;

THE PRESIDENT IN THE CHAIR.

Mr. Alfred Lewis and Mr. Thomas Eaton were elected Members of the Association.

The President introduced to the notice of the meeting a specimen of the Pure Resin of Scammony, prepared by the new process, which he presented to the Museum.

The early part of the meeting was occupied with a discussion on the Weights and Measures which it was thought desirable to introduce into the new Pharmacopœia. The President advocated the avoirdupois pound as the unit, and decimated in the same manner as proposed by Mr. Warington. Dr. Edwards gave a general outline of the various propositions, and several of the new systems which had been suggested were explained, and their relative merits canvassed, but the opinion generally ex-

pressed was that it was undesirable to introduce any new system whatever at present, as it was likely that in a few years a comprehensive change in the present system of weights and measures would be made by the Legislature. Mr. N. Mercer read an interesting paper on "The Chemistry of Wheat and Bread," for which the thanks of the Society were awarded to him.

ORIGINAL AND EXTRACTED ARTICLES.

THE LEAD PANIC AT HASTINGS.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—The discussion which has taken place in your Journal leaves the injurious part of the question entirely unanswered. The gentleman who made the original statement has not demonstrated that lead was present in any one case, nor brought forward a patient who has suffered from that metal; while, on the other side, the charge has been met by inconclusive experiments and equivocal decision, resting upon the absence of quantity and the extent of dangerous disease resulting from drinking the water. I am therefore induced to trouble you with my ideas on the lead poisoning of waters generally, as amongst the thousands of analyses of waters I have made, I have met with many which had produced injury from the presence of lead where that metal could not be discovered by passing hydrosulphuric acid through the water in its original volume. The fact is, that lead in the state in which it exists in solution in water (bicarbonate) is not so sensitive to hydrosulphuric acid as in the acetate, and consequently that mode of proceeding should not be adopted. I evaporate 10 ozs. of water to dryness, moisten the residual salts with nitric acid, and again evaporate at 212°. The neutral nitrates of lead and earths are now dissolved in a small quantity of water, and hydrosulphuric acid passed through the solution while warm; the sulphuret now readily falls, and may be rendered very evident by dropping it on filtering paper, on a chalk stone, or if to be estimated, can be collected in a tared watch-glass and weighed; it is astonishing what a small quantity of this metal will affect the general health. In one case where a whole village suffered from lead mining operations, I found but a half-millionth part of the weight of the water, yet nearly all the inhabitants complained of loss of appetite, listlessness, pains and loss of strength in their legs, costiveness, &c.; the general belief was, that it was owing to the water, but one man who was a disbeliever, in foolhardiness drank a very large quantity, and was attacked with dry colic; upon my finding the lead, they abandoned the use of that water, and obtained what they required from a neighbouring spring, when all the symptoms disappeared. In some waters no lead is found as bicarbonate in solution, but they form a sediment of neutral carbonate, which if not disturbed, produces no mischief, but if a rush of water passes over it either in the pipe or at the bottom of the reservoir, it is carried out and may be dissolved in some of the domestic operations. I should say that there is a very great difference in the susceptibility of different individuals, some resisting ten times as much as will affect others; whether this arises from some idiosyncrasy or from their different habits, or from both, I am not able to say. I am, Sir, your obedient servant,

WILLIAM HERAPATH, Sen., F.C.S., &c.,
Analytical Chemist.

THE ADELHEID SPRING.

AN IODO-BROMINE WATER AT HEILBRUNN, IN BAVARIA.

Communicated by A. Albright, Esq.

THE small village of Heilbrunn (literally *Healing-water*) lies eight German miles from Munich, near Benedictbeuren, formerly a monastery, upon a considerable elevation, commanding charming prospects. According to historical traditions, it

may be considered the oldest medicinal spring in Bavaria, and it is said to have been destroyed, together with the monastery to which it belonged, by the Hungarians in 935. A century later (1059) the monks made some excavations, and the source of the spring was discovered at a depth of four fathoms. At the same time a fire burst forth over it, which occasioned the belief that the spring itself was produced by a miracle.

In 1659, the Princess Adelheid, the Elector Ferdinand's wife, who, after being married eight years, was without children, resorted hither, and in a year afterwards bore a daughter, and subsequently other children. It is from this circumstance that the spring has acquired the name of Adelheid's Quelle, bestowed upon it by the present abdicated King Louis of Bavaria. Though this cure brought the spring into greater reputation, it was allowed nevertheless to fall into neglect and disrepair by the monastic authorities, and it was only used for a long time by the country people for the cure of scrofulous and other diseases, and by the villagers for mixing their bread, from finding less salt thereby required.

The reputation of the spring for the cure of scrofula, caused Dr. A. Vogel, of Munich, to investigate it in 1825 for iodine, which he found it to contain in important quantity, and on this its use came to be prescribed by the physicians of Munich and Augsburg.

In the course of the alterations and deepening of the spring, which this more extensive use required, a candle having been brought near the surface, the gas escaping from the bubbles took fire, and it was only after some pains that the flame was put out; thus was the miracle of 1059 explained. In fact, a considerable covering of carburetted hydrogen floats over the mirror of the spring, which will inflame with a sharp crack. At this period the water began to be bottled and exported, and this is continued to the present day to a large and lucrative extent. Its reputation and interest has led within the last 25 years to its analysis by the following eight distinguished chemists: by Vogel, in 1825; Dengler, 1826; Fuchs, 1833; Barruell, 1835; Bauer, 1841; A. Buchner, jun., twice, 1842; Pettenkofer, 1849.

According to the latest analysis by the University Professor, Dr. Pettenkofer, of Munich, with all the required exactness of the present standard of chemical science, there are contained in 16 Bavarian ounces (480 grammes) of the water—

Bromide of Sodium	0.3678	grains	Fixed Constituents
Iodide of Sodium	0.2199	"	
Chloride of Sodium	38.0684	"	
Chloride of Potassium	0.0200	"	
Sulphate of Soda	0.0480	"	
Carbonate of Soda	6.2168	"	
Carbonate of Lime	0.5840	"	
Carbonate of Magnesia	0.1440	"	
Carbonate of Iron	0.0720	"	
Alumina	0.1424	"	
Silica	0.1472	"	
Phosphate of Lime	a trace		
Organic matter	0.1648	"	
Free Carbonic Acid	13.18	cubic centimetres	Absorbed in the Water.
Carburetted Hydrogen	8.02	" "	
Nitrogen	6.54	" "	
Oxygen	1.38	" "	

In 100 measures of the gases escaping from the spring are contained—

Carburetted Hydrogen	75.5 measures
Nitrogen	18.0 "
Oxygen	2.2 "
Carbonic Acid	4.3 "
	100

The bromine being in excess of the iodine, it has in Germany rightly obtained the name of an iodine-containing bromine-water [*Iod-haltendes Brom-wasser.*]

The peculiarity of the spring does not rest, however, either upon one or another of its constituents, but upon the qualitative and quantitative mixture as a whole, and regarded in this light it stands quite alone. The greater number of iodine and bromine springs are

either altogether wanting in two ingredients which play an important part in the Adelheid spring, viz., the carbonate of soda and the carburetted hydrogen, or they contain an excess of common salt. It is the considerable quantities of iodine, bromine, carbonate of soda, and carburetted hydrogen, with a relatively low adjunct of common salt, which lends to this spring its simultaneous dissolving, calming, anodyne effect on the mucous membrane of the stomach and the urinary organs, and which belongs to no other bromine or iodine spring.

When the water is poured into a glass, a multitude of bubbles of gas are formed, and the taste is nearly that of weak salted meat broth. *It excites the appetite, increases the urinary secretion, operates powerfully on the absorbents, and the lymphatic and glandular systems, brings morbid deposits in the organic tissues into a solvent condition, and promotes their removal out of the system by the increased secreting and excreting activity of the kidneys, and this whether the same have been occasioned by simply inflammatory, scrofulous, syphilitic, or gouty affections.* The diseases in which extensive experience has proved its curative effects, are, scrofula and glandular swellings, bronchial affections, disordered condition of the follicles of the mucous membrane, and thickening of the membrane itself, mesenteric disorders, enlargement or hardening of the testicle, female disorders of the womb generally. *It is especially distinguished above all ordinary remedies* for its effects in urinary diseases, also in diseases of the bones and joints. In one case of excessive obesity it effected a cure by a reduction in the weight of the body of 113 pounds.

It only remains to state that the water preserves its quality for years, in fact, indefinitely, and that the salts, &c., that it contains are brought into a saleable form, and that both the water itself and the salts will soon be probably on sale in London.

ON POISONING BY NICOTINA, AND DETECTION OF THE POISON.

BY ALFRED S. TAYLOR, M.D., F.R.S.

[The following description relates to an examination conducted in a case of poisoning by nicotina, which was noticed in this Journal, vol. xviii., page 46. The particulars of the death, having been already published, are omitted here.]

The body was examined sixty hours after death, the temperature being at the time above 70°. Externally, decomposition had advanced to a great extent; but there was no odour of nicotina, or any smell resembling that of tobacco. The only perceptible smell was that of ordinary putrefaction. When the body was again seen, seventy-eight hours after death, the features were much bloated and distorted, resembling those of a person who had died by drowning, and whose body had been exposed in hot weather. The skin was of a greenish-white colour, except in the course of the great venous trunks, where for some space on each side it had assumed a deep green colour. The neck was greatly distended, and putrefaction had obviously gone on to some extent in the course of the large veins: these appeared full, and as if the blood in them were much decomposed. The sides of the face in the bloated parts, and the sides of the chest in the whole of the intercostal spaces, had a deep bluish-green colour, as if from the decomposition of blood effused in the cellular t issue. The green colour was observed also on the skin of the back, and in all the dependent parts of the body. The limbs were relaxed: the lower extremities and feet presented no unusual appearance, but the arms were beginning to be decomposed.

About the upper end of the chest-bone, and at the root of the neck, there was a diffused spongy swelling of the skin, crepitant under pressure, and discoloured by putrefaction. When this was pierced by a knife, gas escaped, followed by a discharge of dark fluid blood from the areolar tissue in which it had been effused. The mucous membrane lining the lips and mouth was not excoriated. On dividing the scalp, dark liquid blood was found effused to a very unusual and remarkable extent, through the structures covering the cranium. On opening the head, the meningeal vessels and those of the brain generally were turgid with black fluid blood. The substance of the brain was healthy, of a darker colour than usual, and the cortical portion presented a green grey tint. On slicing the brain, few or no bloody points were observed. The ventricles contained a few drachms of serous fluid. In the chest, the lungs were found filling the pleural cavities, highly crepitant, and presenting on section a remarkable engorgement with black blood, resembling in colour and appearance black currant jelly. The heart was somewhat small, of a fawn colour, and

very flabby. The cavities were empty, with the exception of the left auricle, which contained about two drachms of blood, resembling in colour and fluidity that found throughout the body. The stomach was distended with gas, and externally it did not present any unnatural appearance. It contained a small quantity of chocolate-coloured fluid of a treacly consistency. When this was removed, the whole of the mucous membrane presented a dark crimson-red colour, as if stained with black currant jelly. There was the most intense congestion of the whole of the capillary vessels, but there was no abrasion, corrosion, or destruction of the coats. These were not softened : they had their usual tenacity and strength. The deep crimson colour of the mucous membrane was especially marked at the cardiac end of the stomach. No odour resembling nicotina or tobacco could be perceived on opening the cavities of the body, and the stomach and its contents had merely the smell arising from incipient putrefaction. The liver and lungs were almost purple-black, from the amount of congestion in their capillary structure. The blood was liquid, but in some parts thickened to the consistency of treacle—the fibrin appeared to be broken up and destroyed. Its colour was peculiar, resembling black currant juice. The stomach and contents, with the blood and other portions of the viscera, were secured in a bottle, and submitted, on the day following the inspection, to a chemical examination.

Analysis.—One half of the stomach with the adhering contents was cut into small pieces and shaken with a quantity of ether in a bottle. The contents were allowed to digest for an hour, being occasionally shaken. The ethereal liquid, which had acquired a yellow colour, was then poured off and spontaneously evaporated. The residue had no particular odour ; it was a soapy-looking mass having an alkaline reaction. This residue was mixed with a solution of pure potash, and distilled, at first at a low, and afterwards at a high temperature. A small quantity of colourless liquid was obtained, which had a well-marked alkaline reaction. There was no odour of ammonia, but a peculiar odour which bore some resemblance to nicotina much diluted with water. On warming a portion, test-paper applied to the vapour indicated a slight volatile alkaline reaction. Chloride of platina gave a yellowish crystalline precipitate, presenting well-defined feathery prisms under the microscope; corrosive sublimate gave a white precipitate; arsenio-nitrate of silver, a bright yellow precipitate ; iodine water, a turbid reddish-brown precipitate; tannic acid, a yellowish-white precipitate ; and gallic acid produced in it no precipitate and no change of colour. A portion of the liquid allowed to evaporate spontaneously, left some oily-looking globules, which, on being heated, evolved acrid pungent fumes, resembling nicotina. The soapy residue in the retort was mixed with a sufficient quantity of hydrate of lime to render it a stiff paste, and this was submitted to distillation. An additional quantity of a clear colourless liquid was obtained, which had the odour of nicotina, was strongly and fixedly alkaline, and gave with the tests all the results above described. A portion of this was neutralized by diluted hydrochloric acid, slowly evaporated on a glass slide. When examined by the microscope no dagger crystals of hydrochlorate of ammonia were obtained, showing an entire absence of this alkali.

The liver and lungs had been placed in the same bottle with the stomach (cut open) and its contents, so that no inference of absorption and deposition could be drawn from a separate analysis of those portions of the organs which had been reserved.

The remaining half of the stomach, as well as the portions of liver and lungs, were cut into small pieces and divided into equal parts, for the purpose of separating nicotina by the processes of Orfila and Stas, in order that a comparison might be made of their relative value.

Orfila's Process.—The portions of viscera were placed in a glass vessel, containing five ounces of distilled water, to which five drops of pure sulphuric acid had been added. The animal matter was well stirred with the feebly acid liquid, and allowed to stand for about forty hours. It was then strained and filtered, and the residue pressed. The object of this stage is to produce sulphate of nicotina. As the alkaloid is liquid, and easily unites to acids and forms salts, no heat is required for solution or combination.

2. The highly coloured acid liquid thus obtained was evaporated in a water-bath to one half, and this led to the separation of a thick coagulum. Cold alcohol of a sp. gr. of .826 was poured on the acid liquid and well mixed by stirring it. This caused

a further coagulation. After a short digestion it was filtered, and a clear liquid of the colour of pale sherry wine was thus obtained. The greater part of the organic matter had been thus effectually separated. The liquid was evaporated over a water-bath, and the fatty residue which resulted was separated by agitation with a small quantity of water and filtration through a wet filter.

3. The aqueous solution procured amounted to four fluid drachms: it was feebly acid, and slightly coloured. It was rendered alkaline by pure potash, and shaken with its volume of pure ether in a stoppered tube. The ethereal liquid was decanted, and portions were allowed to evaporate spontaneously in a number of watch-glasses. Oily-looking globules were obtained in each case. These had the peculiar odour of nicotina, which was only strongly evolved when the watch-glass containing them was heated. The odour was acrid and pungent, affecting the nostrils and throat, and producing headache. The oily-looking residue in each watch-glass was mixed with a few drops of water. It was readily dissolved, and had a strong alkaline reaction. The reagents above mentioned were applied to the solutions thus obtained with the most conclusive and satisfactory results. Chloride of platinum produced the feathery crystals (visible under the microscope), which it produces with a solution of nicotina. Tannic acid gave a dense yellowish-white, and iodine water a red-brown precipitate, and it was found that a solution of permanganate of potash had its colour immediately discharged.

Stas's Process.—Five ounces of distilled water, in which eight grains of crystallized oxalic acid were dissolved, were used for the solvent in this case. The remaining portions of the viscera were digested in this liquid, and the subsequent steps of the process were in all respects similar to those above described. The differences observed were: that the various solutions obtained were of a darker colour; and the quantity of nicotina removed from the viscera by the oxalic acid was larger and in a more concentrated form. The globules of nicotina obtained had a stronger alkaline reaction when dissolved in water, and the precipitates obtained by the reagents were more copious.

Neither of these processes will enable the analyst to separate the whole of the nicotina from the organic matter. In order to determine this question, the brown, watery, alkaline liquid, which remained in the tube after agitation with successive quantities of ether, was, in each case, distilled; and a clear, watery product was obtained, containing nicotina and ammonia. By exposure in a dial-glass for twenty-four hours, the whole of the ammonia had passed off, and the oily-looking globules left as a residue were found to consist of nicotina. A larger proportion was obtained from the residue of the sulphuric acid process than from the residue of the oxalic acid process, showing that a greater quantity had been extracted by ether in the process of *Stas*.

It was thus proved that nicotina was present in the body of the deceased. The result of the inquest was that the deceased had died from the effects of nicotina, which he had voluntarily taken for self-destruction while labouring under temporary insanity. The circumstances rendered it probable that deceased had procured the bottle of nicotina from the laboratory in the evening, that he had retired to the water-closet, and had remained there the whole night; that on hearing persons moving about in the morning, he swallowed a quantity of the poison from the bottle, returned the stopper, and had probably intended to conceal the means of death by throwing the bottle down the closet: but he fell forward powerless in the act, and the bottle dropped from his hand. The label had been previously scratched off. The quantity of this poison taken by him cannot therefore be determined; it is probable that the greater part of the contents of the bottle were spilt. It is well known that two or three drops of nicotina are sufficient to destroy life; and that this quantity, at least, had reached the stomach is rendered probable by the result of the chemical analysis. The time which he survived after taking the poison must be a matter of inference. It may be assumed from the circumstances, that he was insensible and powerless within a few seconds, and that he died in from three to five minutes. There were no convulsions. The poison appears, in this case, to have acted as a pure narcotic.

This is, so far as I can ascertain, the only case of poisoning by nicotina which has occurred in this country. There is only one other on record: this occurred in Belgium, and was the subject of a trial for murder in 1851. The Count and Countess Bocarmé were charged with the murder of the Countess's brother, a M. Fougnies, by administering to him nicotina, while dining with them in the Château of Bitrement.

The deceased did not survive more than five minutes, and was not seen living by any of the attendants. The possession of the poison, as well as the moral evidence, fixed the crime on the Count, and he was condemned and executed. The appearances after death in the case of Fougnies were, to a great extent, altered or destroyed by the pouring of some strong acid (acetic) into the mouth and over the body of the deceased, in order to conceal or remove the odour of nicotina. M. Stas conducted the chemical investigation, and succeeded in detecting the poison in small quantity in the tongue and fauces, stomach, liver, lungs, and in a wooden plank of the floor of the room in which the deceased was sitting.

Properties of Nicotina: its Effects on Animals.—A specimen of this alkaloid was given to me by Dr. Hofmann. It had a pale amber colour: when poured from the bottle it flowed like a thin oil: it gave a greasy stain to paper, which was speedily removed by evaporation; and it evolved a peculiar odour resembling stale tobacco-smoke. When heated on platina it produced a dense white smoke, acquired a dark colour, took fire, and burnt with a bright yellow flame, giving off an abundance of carbon as a thick, black smoke, and leaving a small quantity of carbon as a residue.

Strong sulphuric acid in the cold did not carbonize it, but the nicotina acquired a reddish colour, which was deepened by heat. When the heat was continued, the mixture became darker, and white vapours of sulphurous acid, as well as of nicotina, were evolved. Sulphuric acid in the cold, with a crystal of bicromate of potash, produced, after a time, a green colour, from the separation of oxide of chromium. Fuming hydrochloric acid brought near to a drop of nicotina, produced dense white vapours of the hydrochlorate, resembling those caused by ammonia under the same circumstances. When heated, the hydrochlorate of nicotina escaped in dense white vapours, leaving as a residue a carbonaceous stain. Nitric acid produced in the cold no change, but when heated the mixture acquired a dark orange colour. After a time, the acid was suddenly and violently decomposed with the evolution of nitrous acid vapour.

Nicotina, in a concentrated state, is powerfully alkaline. Two drops dissolved in an ounce of distilled water gave to the liquid a strong alkaline reaction. The solution, in this diluted state, had the peculiar odour of the alkaloid. A piece of paper dipped in pure nicotina, when ignited, burnt with a yellow smoky flame, as if it had been dipped in oil. It is very soluble in water, alcohol, and ether; and ether possesses the property of removing it, although not entirely, from its aqueous solution. The solutions have the odour and the other chemical properties of the alkaloid. In spite of its powerful odour, nicotina does not appear to be very volatile. It remains as a greasy-looking spot in a watch-glass, after many hours' free exposure to the air; and even after twenty-four hours, the application of heat to the thin film of moisture in the glass led to the evolution of the peculiar pungent odour of this alkaloid. The vapour evolved from the pure alkaloid does not perceptibly affect test-paper like that of ammonia, although there are abundant white fumes produced on exposure to hydrochloric acid in both cases. If ammonia should be mixed with nicotina, that alkali is removed with the water by simple exposure. The hydrochlorate of ammonia forms permanent dagger crystals; the hydrochlorate of nicotina is deliquescent, or only imperfectly crystallizes in short wide prisms crossing each other at right angles.

Nicotina strikingly resembles ammonia in some of its properties, and as ammonia may result from the action of potash on organic matter, especially when heat is employed, it is necessary that an analyst should have the means of distinguishing nicotina from ammonia, and of separating one from the other. They both produce an orange yellow precipitate with chloride of platina; when examined by the microscope the ammonia-precipitate is in octahedra or dodecahedra—the nicotina-precipitate is seen in groups of feathered crystals peculiar in shape and arrangement, mixed with well-defined octahedra. Both ammonia and nicotina are precipitated of a yellow colour by arsenio-nitrate of silver, and white by corrosive sublimate. The striking chemical reactions in which they differ are these: iodine water has its colour discharged by ammonia; it is precipitated brown by nicotina: tannic acid produces a red colour with ammonia, without precipitating the alkali; it precipitates nicotina of a pale yellowish-white, like the other alkaloids, but produces no change of colour: traces of ammonia are thus easily detected in a solution of nicotina by this reagent. Gallic acid rapidly imparts to ammonia a pink-red colour, while it produces no change of colour or precipitate in nicotina. The red colour produced by ammonia

slowly changes to an olive-green. Chloride of gold gives an amorphous brown precipitate of fulminating gold with ammonia, while it produces a plumose crystalline precipitate of a yellow colour in a solution of nicotina. Nitrate of silver yields with ammonia brown oxide of silver, soluble in an excess of the alkali; with nicotina it produces an opalescence not soluble in excess; and, on heating the mixture, silver is slowly reduced and separated. Permanganate of potash is scarcely affected in its colour by admixture with ammonia; but the colour is rapidly destroyed by nicotina even in a very diluted state. As ether and most organic substances discharge the pink colour of the permanganate, care must be taken that the nicotina is not combined with any of these matters. When we know that we are dealing with nicotina alone, a standard solution of permanganate of potash may be employed to determine the quantity present. The quantity of permanganate which has its colour discharged on admixture with a certain measure of nicotina, will be great in proportion to the strength of the alkaloid; and if the solution of permanganate be previously tested with a measured quantity of nicotina, the proportion present in an unknown case may be thereby determined. A solution of two drops of nicotina to one ounce of water is sufficiently strong to give all the reactions above described.

As a summary of these distinctions between ammonia and nicotina, it may be stated, that nicotina is specially identified by its strong and peculiar odour, wholly unlike that of ammonia, either in the cold or when heated—by the precipitate, without change of colour, given by tannic acid—the reddish-brown precipitate by iodine water—and the immediate destruction of the colour of a solution of permanganate of potash.

If ammonia is mixed with nicotina, it may be separated either by spontaneous evaporation, or the mixture, neutralized by diluted sulphuric acid, may be carefully evaporated to dryness, and the residue treated with alcohol. Sulphate of nicotina is dissolved, while that of ammonia remains.

Experiment on a Rabbit.—A single drop of the pure nicotina, examined in the above mentioned analysis, was placed at the back of the mouth of a healthy rabbit. The taste appeared to be affected, the animal frothed at the mouth, and a quantity of frothy mucus issued from between the jaws, which were closed.

Symptoms.—In from fifteen to twenty seconds the animal lost all power of standing on its legs; it fell on its side, and was violently convulsed in its fore and hind legs; these were in rapid motion for half a minute, and the back was arched in opisthotonos, but again speedily relaxed. The animal then lay tranquil for about a minute, when it was again suddenly seized with similar clonic convulsions; these ceased, and the animal appeared to be dead. The heart continued to contract for about half a minute, and then ceased. The animal died in three minutes and a half from the time at which the poison was placed in its mouth. During the convulsions, and after death, it was observed that a quantity of frothy mucus escaped from the mouth. This was strongly alkaline, and it was supposed to have the odour of nicotina; but as the air of the room was impregnated with the vapour, nothing certain could be said on this point.

Appearances.—The body was examined in an hour and a half after death. The eyes were prominent and staring; the limbs were relaxed, but these became rigid about half an hour later. On opening the abdomen the stomach was found distended with food. When laid open, the only odour perceptible was that of sour green food. The coats were pale, and the blood-vessels were strongly marked in their course by the dark-coloured blood which they contained. The intestines were pale, but there was great congestion of the vessels of the mesentery. The liver and kidneys were congested with dark-coloured blood; the lungs were pale and not congested; the right cavity of the heart contained a small quantity of blood of a dark colour, and in a partially coagulated state. The left cavities were empty; the blood which escaped during the inspection was fluid, and of a dark, claret-red colour, with a pinkish tinge when seen in a thin layer; on exposure to the air it became lighter in colour, but did not pass to a florid red. The colour of the blood was similar to that which I have occasionally seen in poisoning by prussic acid and the essential oil of bitter almonds.

Analysis.—The parts removed for analysis were: 1, the stomach and its contents; 2, half an ounce of blood collected from the vessels of the abdomen; 3, the liver; 4, the heart, kidneys, and lungs; 5, the tongue, palate, and soft parts adjacent. None of these organs or parts had the odour of nicotina. This was only perceptible near

the mouth of the animal, but it rapidly disappeared. The stomach contained about two ounces of green vegetable matter, which had an acid reaction—it had obviously undergone fermentation. Although examined within two hours of death, no odour of nicotina or tobacco could be perceived by four persons who were present. This led to the supposition that no part of the drop of alkaloid which had destroyed life could have reached the stomach. The stomach and its contents were treated by Orfila's process, as elsewhere described, with the result that a small quantity of nicotina was separated, possessing the odour and properties assigned to this alkaloid.

The half-ounce of blood similarly treated also yielded nicotina in sufficient quantity to allow of the bare inference of its presence. The odour of the separated alkaloid was masked by some other organic principle. Some blood of an animal not poisoned by nicotina was submitted to all the steps of the analysis, with negative results. The liver, weighing two ounces, and the heart and lungs together, were separately examined by the same process, but nicotina was not detected in the tissues of these organs. The tongue, palate, and soft parts of the mouth, were similarly treated after a week. The membrane of the tongue was softened, and readily peeled off; this effect was probably partly due to putrefaction, as one drop of the alkaloid would not have been sufficient to cause such local changes. In these parts, nicotina was distinctly present. A sufficient quantity was separated in a pure state, not only to lead to the recognition of the odour, but to allow of the application of all the characteristic tests.

Hence it follows that, in poisoning by this alkaloid, even when the quantity remaining in the body is small, it admits of detection in the stomach and in the blood, but not always in the tissues. Of the single drop administered to the animal, a portion had clearly escaped with the frothy mucus and saliva issuing from the mouth. A minute quantity had passed into the stomach, and was diffused through a large quantity of food, while a trace was detected in the blood; but the largest quantity was found in the parts to which the poison had been directly applied, and which it had no doubt penetrated by imbibition. The results do not show that nicotina is not deposited in the viscera in cases of poisoning by it, but simply, when the quantity is small and death is rapid, that none may be found.

Pathological Effects of Nicotina.—The action of this poison upon animals has been lately investigated by M. Claude Bernard.* His experiments show that mammalia, birds, and reptiles, are destroyed by nicotina under similar symptoms; and that whether applied to the alimentary canal, to a wound in the skin, or to the mucous membrane of the conjunctiva, its rapidly fatal effects are equally manifested. The arterial capillary system appears to be specially affected by the poison, through the medium of the sympathetic nerve. The circulation is here arrested, while the heart continues to pulsate. The veins are full, but they no longer convey the blood onwards. Nicotina appears to affect the nervous system of organic life, just as strychnia affects the nervous system of animal life, and convulsions in either case are among the most prominent symptoms. According to this view the influence of the sympathetic nerve is specially manifested on the vascular capillary system.

Nicotina, like prussic acid, is a compound of carbon, nitrogen, and hydrogen. It contains no oxygen. Its formula is C_{10} H_7 N. When exposed to air and light it undergoes a chemical change, and acquires a brown colour; its energy as a poison is thereby reduced. Bernard states that he found the *modus operandi* of the partially decomposed poison to be different from that of pure nicotina. The functions of the heart and lungs were directly affected by it; while the pure poison chiefly spent its physiological action on the capillary circulation. He also found that the perfectly pure nicotina produced tetanic rigidity of the limbs. These results may explain the different views which have been entertained of the mode in which nicotina operates. One set of experimentalists have arrived at the conclusion that it acted exclusively on the muscular system, while another set have contended that the circulation alone was directly affected. The degree of purity of the nicotina employed may, in some measure, account for these differences.

Convulsions are not a necessary attendant on this form of poisoning. There were none in the case of M. W. They were observed in the experiment on a rabbit, but they were of a clonic, in place of a tetanic character. The temporary production of

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* "Leçons sur les Effets des Substances Toxiques et Médicamenteuses," &c. p. 397. Paris: 1857.

opisthotonos, however, proves that the spinal marrow was affected by the poison. The effects produced on the rabbit show the fallacy of relying upon the symptoms caused in animals as evidence of their character and course in the human subject.

It is evident from the case which is the subject of this paper, as well as from the experiment on the rabbit, that nicotina produces changes in the blood. The microscope shows no appreciable physical differences; but the colour and consistency of this liquid are entirely changed. The whole of the blood, arterial and venous, acquires a purple-black colour, and the fibrine appears to be dissolved or broken up. Is it to be inferred from its chemical constitution that nicotina completely deoxidizes the blood with the rapidity with which it deoxidizes the solution of permanganate of potash, and that death is the immediate consequence of this universal deoxidation of the vital fluid? When exposed to air it reabsorbs oxygen to a slight extent, and acquires a ruddy hue. These facts may theoretically account for the rapid action of this poison on the body; but, in addition to this mode of action, it appears to operate by causing a complete stagnation of the altered blood in the overfilled capillaries. In the case of M. W. the appearance of the various organs, as a result of capillary congestion, was such as I have never before seen. They appeared as if they had been dyed with a deep purple-black dye. This condition, it must be remembered, is the result of the action of the poison in a *few minutes* —a period just sufficient for its circulation throughout the body. In the experiment on the rabbit the heart continued to beat, as in asphyxia, for a short time after all other vital actions had ceased; and this fact, viewed in connexion with the condition of the capillary system after death, appears to show that there is some foundation for the theoretical view of Bernard, namely, that this powerful poison destroys life by arresting the circulation from the circumference to the centre.

ON THE YELLOW COLOURING MATTER OF THE FRUIT OF *GARDENIA GRANDIFLORA*.

BY F. ROCHLEDER.

Lorenz Mayer has prepared and investigated the colouring matter of the Chinese yellow pods in Rochleder's laboratory. Rochleder states that the fruits were reduced to a coarse powder, and this was extracted with alcohol. The deep-coloured decoction was first strained through linen, then filtered through paper, and finally distilled in the water-bath. The aqueous residue is covered with a green or nearly black stratum, which is separated from the aqueous fluid by filtration through a moist filter. This mass possesses a rancid odour, and consists for the most part of a fluid fatty acid. Of a colourless crystallized body, which appears to be a mixture of two kinds of wax with very different melting-points, no quantity sufficient for investigation could be obtained.

The aqueous fluid, freed from fat, which remains after the alcohol is distilled off, was diluted with much water, and mixed with hydrate of alumina, prepared by the precipitation of alum, and thoroughly washed. After standing for several days, the fluid was separated by filtration from the alumina, and the compounds of alumina formed. The mass remaining on the filter is dingy, of a brownish-yellow colour; it contains all the tannic acid, as well as some colouring substances produced by the decomposition of the colouring matter and tannic acid. The filtered liquid is mixed with an aqueous solution of basic acetate of lead, by which a fine orange precipitate is produced: this is rapidly filtered, washed with water upon the filter, then suspended in water and decomposed by a current of sulphuretted hydrogen, when the colouring matter is taken up and retained by the sulphuret of lead.

The sulphuret of lead is therefore thoroughly washed with water, and the filtered fluid and washing-water are set aside; the washed sulphuret of lead is then boiled with alcohol, which takes up the colouring matter, and the solution is separated from the sulphuret of lead by filtration upon a water-bath funnel. This solution is evaporated *in vacuo* over sulphuric acid, as the colouring matter would be altered by the continued application of heat. The amorphous residue is dissolved in water, of which the smallest possible quantity should be used; the solution is filtered from some separated sulphur, and again reduced to dryness *in vacuo* over sulphuric acid. Rochleder names this colouring matter

Crocine, because he finds it to be identical with that of the crocus.; its composition is $(2\ C_{58}\ H_{42}\ O_{30}) + HO$. When pounded it forms a bright red powder,

which is readily soluble in water and alcohol. The solutions possess the colour of that of chromic acid. Lead-salts give orange-red precipitates with the colouring matter. The concentrated aqueous solution, when mixed with concentrated sulphuric acid, becomes first indigo-blue, then violet. The aqueous solution of crocine is decomposed by dilute sulphuric and muriatic acids when heated ; a product of decomposition of a fine dark red colour is separated. The fluid retains a yellow colour from a small quantity of this product ; it contains in solution a sweet crystallizable, colourless body. Analyses:—

	I.	II.	III.
C.	54.87	54.78	54.76
H.	6.71	6.55	6.93
O.	38.42	38.67	38.31

In the decomposition of crocine by muriatic or sulphuric acid, a body is obtained to which the author gives the name of

Crocetine; its composition is $C_{42} H_{23} O_{11}$. It is a dark red, amorphous powder, sparingly soluble in water, readily soluble in alcohol, and not insoluble in ether. With concentrated sulphuric acid it exhibits the same blue colour as crocine. Lead-salts give citron-yellow precipitates with solutions of crocetine. Crocetine is a true dye-stuff; tissues mordanted with tin-salt are dyed dingy greenish-yellow by it, but when treated with water containing ammonia, acquire a brilliant golden-yellow colour, which resists exposure to light and air, and undergoes no alteration when washed with soap. The Chinese, as is well known, dye the yellow robes of the mandarins with the fruits of the *Gardenia.*

The decomposition of crocine by muriatic acid, as well as by sulphuric acid, takes place with remarkable facility. It is, however, indispensably necessary to effect this decomposition in an atmosphere of carbonic acid or hydrogen, as oxygen is taken up by hot solution of crocine, and still more readily by those of crocetine. This alteration is perceptible even by the less pure colour of the crocetine which has been separated with access of air. That a body which is readily altered by the oxygen of the air, is still more rapidly attacked by it at the moment of separation, is no more than was to be expected. In fact, analyses of crocetine which had been prepared with access of air, furnished a far smaller amount of hydrogen than that of pure crocetine.

In the decomposition of a very concentrated solution of crocine by dilute acids, the greater part of the crocetine (about 41 per cent.) separates from the fluid, so that about 8 per cent. remain dissolved in the fluid, which receives a golden-yellow colour from it.

If the decomposition be effected by muriatic acid, and the fluid filtered from the crocetine be treated according to the method formerly described by the author, there remains after evaporation a readily crystallizable body of a sweet taste.

In the attempt to determine the quantity of this sugar with Fehling's fluid, the following results were obtained:—In the decomposition with muriatic acid there were found 28.5 per cent., and in that with sulphuric acid 27.94 of sugar ($=C_{12} H_{12} O_{12}$), But as no third volatile or non-volatile product of decomposition could be discovered, this is not grape-sugar, but another hydrate of carbon, which reduces exactly half as much peroxide of copper as grape-sugar. Analyses of crocetine :—

	I.	II.
C.	64.33	64.60
H.	7.52	7.26
O.	28.15	28.14

This composition of the colouring matter does not allow us to overlook some interesting relations to other constituents of (the fruits of) *Gardenia florida.* Von Orth, who investigated these fruits four years ago, found a tannic acid in it, which is retained by the alumina in the process recommended by L. Mayer for obtaining the yellow colouring matter. Its composition was found by Von Orth to correspond with the formula $C_{45} H_{28} O_{26}$. If the elements of sugar be deducted from this substance, there remains a body of the formula $C_{34} H_{18} O_{16}$, that is to say, a substance which contains about 5 equivs. less hydrogen and 5 equivs. more oxygen than crocetine. A resinous colouring matter which was analyzed by Von Orth, gave numbers corresponding with the empirical formula $C_{80} H_{49} O_{31}$. This colouring matter must receive the formula $C_{28} H_{17} O_{11}$, which makes this resinous colouring matter appear to be the last member of the same series of homologous substances to which crocetine belongs, for $C_{28} H_{17} O_{11}$ differs by $C_6 H_6$ from crocetine$=C_{34} H_{23} O_{11}$.

All the reactions of the colouring matter of the fruits of *Gardenia grandiflora*, as well as its properties, agree perfectly with those of polychroite or the colouring matter of saffron.

The composition of the latter colouring matter was ascertained by Quadrat. He found 54.54 and 54.47 per cent. of carbon, consequently rather too little (0.4 per cent.), and also too little hydrogen; he evidently operated upon an impure colouring matter.—*Sitzungsber. der Akad. Wediss. zu Wien.*, xxix., p. 1, and *Chemical Gazette.*

WATER GAS.

The production of hydrogen gas by the decomposition of water is well known, but for illuminating purposes it is equally well known that the flame from pure hydrogen alone is worthless, though for heating stoves it has been successfully applied. When jets of lighted hydrogen are made to burn in a grate filled with loose fragments of platinum foil, a very cheerful-looking fire is produced, and this is well known to the public under the name of Bachhoffner's Polytechnic fire, from its frequent exhibition a few years since at the Polytechnic Institution by Dr. Bachhoffner. Hitherto the expense of producing hydrogen gas for heating purposes has prevented its being manufactured on a large scale. Many patents have, however, been taken out during the last few years for producing hydrogen gas from water, and bringing it into combination with rich gases derived from oil, resin, tar, naphtha, Cannel coal, and other materials, yielding highly illuminating gases. Among those who have been working in this direction, and have taken out patents for effecting the purpose, may be named—Donovan, Louz, Manby, Val Marino, Radley, White, Croll, Webster, Barlow, Gore, &c. The processes described by these gentlemen do not differ greatly, but almost the only one which appears to have been carried out practically on any tolerably large scale, is that of Mr. White, under whose patent several towns in the north, and factories in Lancashire, have been lighted with gas manufactured from water, combined with the gas from resin or Cannel coal.

Some small works have been erected at St. Ives on Mr. Webster's patent. Dr. Frankland, at Manchester, made a large number of experiments in reference to this gas on works erected by Mr. White, at the mills of Messrs. Clark and Co., with a view to ascertaining its illuminating power and its cost as compared with that derived from coal. The result of these experiments was in favour of the water gas, both as to illuminating power and cost. Notwithstanding this, from some cause or other its use has not extended.

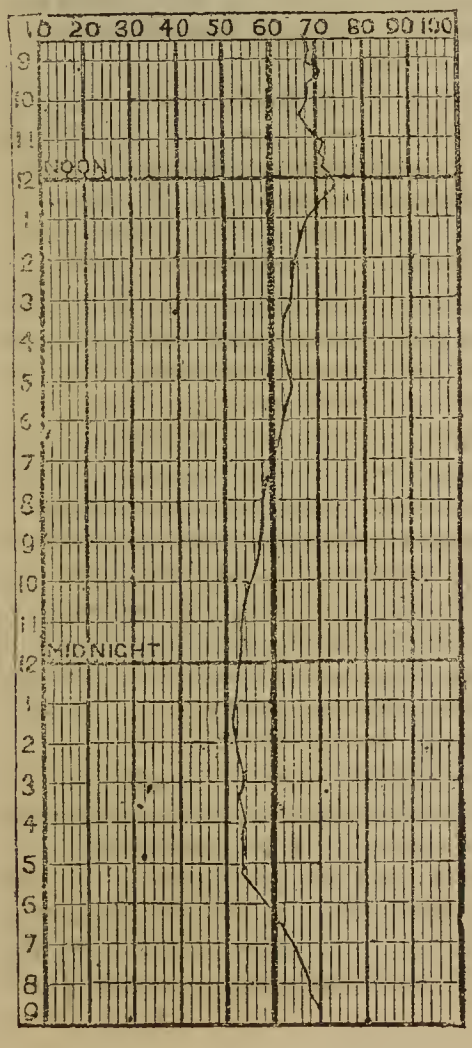
It is unnecessary now to say more in reference to this mode of utilizing for illuminating purposes the hydrogen gas derived from water, as the object is now to call attention to a mode of producing hydrogen gas from the decomposition of water, rendering it applicable for illuminating purposes without combining it with the gases from resin, Cannel coal, and other substances. M. Gillard, some years since, turned his attention in this direction, and took out patents for obtaining hydrogen from water, which he used both for heating and illuminating purposes, the light being produced by burning the hydrogen beneath a cap of platinum wire, which, thus heated to incandescence, gave a brilliant light. M. Gillard has since been engaged in perfecting his invention, and has lately taken out patents for his improvements. He has erected some small works at Highgate, where the process is now carried out, and some of the public lamps in the neighbourhood are lighted on this principle. The method adopted at the works is as follows:—Steam from a boiler is carried through pipes, in which it becomes superheated, whence it is carried into iron D retorts, and dispersed over layers of incandescent charcoal by means of a number of small orifices in tubes running through the length of the retorts. The object is to disperse this superheated steam in as finely a divided state as possible over the heated charcoal. The gas thus produced, after passing the hydraulic main, is conducted through the condensers into a lesser purifier, where it becomes deprived of its carbonic acid, and enters the gas-holder for distribution as nearly pure hydrogen. In this state it may be used for heating purposes, but for illumination the gas is made to pass through an argand burner, with more numerous and smaller holes than are ordinarily used for other gas. This burner is surmounted by a cage or network of moderately fine platinum wire, fitted to it in such a manner as to stand a little above the dull flame of the hydrogen. This cage of platinum, as soon as the gas is lighted, is converted into a cylinder of intense white light over the surface of the platinum. The light is stated to be perfectly pure, and from the nature of the arrangement is necessarily steady. The inventor states that the gas can be manu-

factured at a less price than that from coal, and the small amount of platinum used for the burner adds but little to its cost. The city of Narbonne is lighted with this gas, and M. Gillard is under contract for three years to supply the public lights there, about five hundred in number.—*Society of Arts Journal.*

THE CHRONOMETRICAL THERMOMETER.

For some months past an instrument has been in use at the Samaritan Hospital which deserves to be more generally known, as it serves to keep a permanent record of the temperature of a ward or sick-room day and night. The annexed cut is a good representation of the instrument, showing the clock face below, the thermometer slip above, and at the top a portion of the metallic tube which is used in place of mercury.

The thermometrical tube is connected with a clock movement, which puts in motion a drum, to which a strip of paper is attached. The thermometric tube expands and contracts as the temperature varies, and the motion thus produced is conveyed to a pencil that inscribes a line upon a strip of paper. This line is the permanent record of the temperature. When the strip of paper is filled up, a fresh strip is attached. These strips are ruled. The vertical lines represent the thermometric scale. The horizontal lines correspond with the hours of the day and night. The strip of paper shows at a glance what the temperature of the sick-room has been during any moment of the day or night, the precise moment when a change took place, and how long such change continued. The clock movement, which consists of an excellent eight-day timepiece, not only propels the strip exhibiting the temperature, but also shows the time. The action of this thermometer is very quick. Changes of temperature, however slight, are instantaneously indicated. This arises from the large amount of metallic surface exposed to the air. The mercurial thermometer, on the contrary, is very slow in indicating slight changes of temperature. This is owing partly to the substance of the glass opposing an obstacle to the transmission of heat to a certain extent, and partly to the bulk of the mercury, offering so small a surface to be acted upon by heat, which must be diffused throughout the mass before any true indication can be given. This property of instantaneous indication renders the Chronometrical Thermometer peculiarly valuable for scientific purposes, and adds greatly to the value of the instrument for hospital use, as if a nurse or patient close a ventilator the elevation of temperature is at once detected and recorded. The annexed slip (reduced in size) exhibits the temperature of the Royal Agricultural Society's Show Yard, at Chester, July 22nd, 1858, written off by one of these instruments, to which was awarded the Society's silver medal.



The instrument is patented by Mr. Gauntlet

of Middlesbro'-on-Tees. We shall be glad to hear that it is brought into general use in hospitals.—*Medical Times and Gazette.*

JAPAN VEGETABLE WAX.

Mr. G. F. Wilson, in a letter to the *Journal of the Society of Arts*, states, "About 700 tons of 'Japan wax' have arrived in one ship, consigned to Messrs. Baring. This wax, as I am informed by Sir William Hooker, is obtained from the *Rhus Succedaneum*, which, I believe, to be a species of *Sumach*, and, therefore, a free grower. The wax in its properties appears to be half-way between wax and vegetable tallow, or Bassia butter. The small parcels which have formerly reached this country have been used in Price's Patent Candle Works in substitution for wax, for hard neutral fat, and, after conversion into the acid state, both for candles and night-lights. For the last, a mixture of Japan wax and fat of low melting point makes a compact, soft, wax-like, body."

THE SUSPECTED CASE OF POISONING AT RICHMOND.

On Wednesday, May 11th, Dr. Thomas Smethurst, lately residing at 10, Alma Villas, Richmond, was brought up before E. Penrhyn, Esq., and a full bench of magistrates, at the Richmond Court of Petty Sessions, charged with the wilful murder of a lady named Isabella Bankes, by the administration of poison in small doses.

Mr. Serjeant Ballantine, instructed by Mr. Teesdale, appeared for the friends of the deceased; and Mr. H. S. Giffard, instructed by Mr. Humphreys, attended for the accused.

The deceased was a single lady of thirty-six years of age, and Dr. Thomas Smethurst, nine years her senior, and both possessed of considerable property. Dr. Smethurst and his wife were residing at a boarding-house in Bayswater, as was also the deceased. An intimacy sprang up between Dr. Smethurst and the deceased, leading to an elopement, and after visiting Brighton and various other fashionable places, they at length came to Richmond, residing first at Richmond Green, and latterly at No. 10, Alma Villas, Richmond Hill. On the third of April, Dr. F. G. Julius was called in to attend the deceased, who was suffering from diarrhœa and vomiting. He believed it was bilious diarrhœa, there being nothing to lead to suspicion. He administered various remedies in conjunction with Dr. Smethurst, and with his sanction. On the 18th he became puzzled, and requested his partner, Mr. Bird, to go in, the result being an opinion that something was being given to keep up the irritation. The lady got worse, with constant vomiting and diarrhœa. Nothing apparently could exceed Dr. Smethurst's care and attention. Dr. Todd, with Dr. Smethurst's sanction, attended and prescribed; the prescriptions were in accordance with the treatment already pursued, and were calculated to allay the irritation, but the symptoms became aggravated. On the following Friday, during Dr. Smethurst's temporary absence, a portion of an evacuation just passed was placed in two bottles and sent to London for analysis; and on Reinsch's preliminary test being applied, viz., the introduction of fine copper wire into the liquid, the wire became crusted with some metallic substance.

The case was laid before a magistrate, after which a warrant was granted against Dr. Smethurst, who was apprehended by Police-constable Jukes, but was admitted to bail. The following morning the lady died, and from what had transpired it was deemed expedient to issue a warrant and apprehend Dr. Smethurst on a charge of wilful murder, which was accordingly done. A *post-mortem* examination was then made. Externally the body exhibited no particular appearances other than those of ordinary death. The intestinal canal and stomach were placed in a jar, sealed, and forwarded to Dr. Taylor. The womb showed an early condition of pregnancy. The cause of death was believed to be chronic inflammation of the stomach and bowels.

Serjeant Ballantine, in commencing the proceedings, said that he should confine himself to those facts which were of the greatest importance in the present charge. Having referred to the lady's position in society, and her highly respectable family, stating that the deceased had a life interest of £5,000, and a personality of £1,700 or £1,800 under her father's will, which she could dispose of as she pleased, the learned counsel stated that, although the deceased lady had been living with the prisoner, he could prove beyond doubt that that lady, whether the prisoner was a

married man or not, had been married to him. Having alluded to the distressing state of the lady up to the time of her death, the apparent affectionate terms upon which she and the prisoner lived, the bedside attention of the prisoner, the contrary effects of the medicine administered by the medical attendants, and the finding of arsenic, he referred to a will which had been executed by a solicitor in Richmond in prisoner's favour, from a document said to have been prepared by a barrister in town, but which could be proved to be in prisoner's handwriting, and although the lady was extremely ill (so much so that the will was executed on a Sunday), refused to have any medical attendant present, as he wished to keep it a profound secret that he and the lady were unmarried. The learned serjeant added that the above facts bore terrible import, particularly as the prisoner was at the time communicating by letter with his wife.

The first witness examined was Miss Louisa Bankes, of 10, Lanark Villas, Maida Hill, who deposed to the effect that she received numerous letters from Dr. Smethurst, informing her of the illness of her sister ; that she went to Richmond on the 1st of May, and attended on the deceased until she expired on the 3rd of May.

The case was then remanded till Friday, May 20, when Drs. Julius and Bird were examined as to the symptoms. Dr. A. S. Taylor then gave the following evidence :—"I have tested a portion of the contents of the bottle No. 2. I sought for arsenic and antimony, and it exhibited the presence of arsenic. Some bottles were delivered to me by Inspector M'Intyre on the 5th and 7th of May, amounting to 37, including some packets of medicine. I have examined the whole of them for arsenic and antimony, and for their general contents. I found no arsenic or antimony in any of them except one and the homœopathic medicine. That one was the bottle marked 21. A bottle marked No. 5 contained 355 grains of the chlorate of potash. It is a salt used by chemists for making lucifer matches, percussion-caps, and for other detonative purposes. It is occasionally used in dysentery, diarrhœa, cholera, scarlet fever, and other biliary complaints. It is by itself an innocent sort of medicine. When taken in harmless doses its properties are diuretic, and forces itself rapidly into the kidneys, and would therefore tend to purify the system from all noxious matter. I think if mineral poison were administered in a mixture of this kind that the surplus would be carried off rapidly. I have never in the whole course of my experience met it in solution with poisons, or heard of poisons being mixed with it. It would dissolve in cold water, but it dissolves more rapidly in warm. When I received this bottle, No. 21, it was about half full of this very watery-looking mixture, and I tested it. It has a cooling, pleasant, saline taste, not repugnant, and no smell. I detected nothing wrong with the taste. I evaporated some in a glass, and examined it by a microscope, and I then found it was not tartar emetic, as I thought. I then applied the tests for arsenic, and every test I tried was destroyed, and failed to show the existence of arsenic, owing, as I supposed, to there being something in it, and my tests convinced me that there was something very peculiar about it that I had never met before. I tried Reinsch's process, but I found that it dissolved the copper gauze as soon as I put it into the liquid. I then determined to exhaust this noxious agent, and continued to put in copper gauze until it no longer possessed the power to dissolve it. I then put in a piece of copper, which at once received the arsenic. I was able to decide by these tests that the mixture was chlorate of potash. I found there was of chlorate of potash seven grains to the ounce, which was 1 and 6-10ths per cent., and there was a grain of arsenic to every ounce. I examined the other bottles of medicine, and found they contained sulphate of quinine, sulphuric acid, prussic acid, chloric ether, and infusion of gentian, and not any one of these substances was in the bottle No. 21. I found that the taste of this bottle was such that no one would be likely to suspect that the mixture contained arsenic, more particularly as the quantity of arsenic was so small that the liquid might be mixed with any kind of food and swallowed without the person being aware of it. Without reference to the opinion of medical men, I believe the effect of giving small doses of this mixture from time to time would be to produce nausea, vomiting, pain in the bowels with purging, and if the doses were continued it would produce chronic inflammation and ulceration of the bowels and stomach, and that the discharges would contain blood and mucus. If these doses were continued the effect would be to slowly lead to death by exhaustion. In the bottles brought to me by Dr. Buzzard I found arsenic. That in the bottle marked 21 is what we call white arsenic, but

I could not give an opinion as to that in the evacuations, because it was mixed with blood and mucus. The bottle No. 1 contained only biliary matter, without any metallic substance."

Dr. Robert B. Todd stated that he was called in to see Mrs. Smethurst on Thursday, April 28th; he found her apparently suffering great pain, and there was a very anxious expression of countenance. He formed an opinion, without hearing the suspicions of Dr. Julius, that it was a case of arsenical or some mineral poison. After some discussion the report of the *post-mortem* examination was read. The prisoner was then formally committed for trial.

On Wednesday, May 25, an inquest was held before Mr. Carter, coroner for East Surrey, at which the above evidence was repeated, but no new fact of importance was elicited, and the inquiry was adjourned till Tuesday the 31st.

TO CORRESPONDENTS.

C. D. (London).—British Pharmacopœia. See page 535 of the present volume.

A Registered Apprentice (Newent).—*Sulphite* of Soda is not often used in medicine, but the dose would probably be rather less than that of the Bisulphite, which is from ʒss to ʒj.

C. B. (London) suggests that "infusions might be conveniently preserved in properly cleansed bladders fitted with stop-cocks; the air being excluded by holding the stop-cock upright, and squeezing the bladder previously filled with the freshly prepared infusion, till it flowed over in an uninterrupted stream, then turning off the cock."

W. J. H. (Macclesfield).—(1.) The inquiry should be made of the Secretary, 17, Bloomsbury Square. Three months are required to elapse between the minor and major Examinations.—(2.) Apply by letter to the Secretary, Society of Apothecaries, Blackfriars, London.

Vinco (Selby).—See vol. xvii., page 440.

A. P. D. (Liverpool).—(1.) The precipitate is caused by the astringent matter in the Tincture of Orange Peel.—(2.) *Syrupus Ferri et Quinæ Iodidi.* Vol. xi., page 431.

Delta (London) sends us an instance of which we have had many others, of the interference of Medical men with the price charged for medicines. A prescription was brought with the question how much? The price being stated, the patient said the surgeon in attendance had told him the charge should only be so much—naming a sum less than the price of the ingredients. If a Chemist were to presume to estimate the value of a prescription by the cost of the pens, ink, and paper he would be justly considered rather impertinent.

Excelsior (London) should send his name and address, that the requisite instructions may be forwarded by post.

E. W. H. (Stockton-on-Tees).—The dose would probably be about half a drachm.

F. E. S.—The salt used as described would probably cause the more complete combustion of the smoke and destruction of the nicotine.

A Young Botanist.—A Botanical Prize has been offered, the particulars of which are given in the April number of this Journal.

W. E. S.—Lindley's *School Botany.*

H. L. S.—Sowerby's *English Botany.*

Pembroke.—See Redwood's *Supplement to the Pharmacopœia.*

Erratum.—Page 588, lines 9 and 10 from the bottom. It should have been stated that this remark applies to the Society in England. The opinion in Scotland was more favourable to Dr. Wilson's proposition.

Instructions from Members and Associates, respecting the transmission of the Journal, before the 25th of the month, to the Secretary, Elias Bremridge, 17, Bloomsbury Square, W.C.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington St. Other communications to the Editor, 15, Langham Place,

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